FORESTRY ABSTRACTS

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INTERNATIONAL FORESTRY CONFERENCES

THE imminence of the 5th British Empire Forestry Conference, due to be held in England from 13th June to mid-July, 1947, and the general resumption of international co-operation in forestry suggest that a review of past activities may be useful. We have therefore compiled a list of the more important conferences with their dates and places.

BRITISH EMPIRE FORESTRY CONFERENCE.

1st Conference, London, 1920.
2nd „ Canada, 1923.
3rd „ Australia and New Zealand, 1928.
4th „ South Africa, 1935.
5th „ had been arranged for 1940 in India, but was cancelled by the War.

INTERNATIONAL FORESTRY CONFERENCE.

Forestry conferences with a limited international representation were organized by the Touring Club de France, in connexion with exhibitions, under the title Congrès international du Bois et de la Sylviculture, as follows:—

1st Conference, Paris, 4th to 7th June, 1900.
2nd „ Paris, 16th to 20th June, 1913.
3rd „ Grenoble, 23rd to 30th July, 1925.
4th „ Paris, 1st to 5th July, 1931.

INTERNATIONAL OR WORLD FOREST CONGRESS.

The International Institute of Agriculture in Rome (IIA) was founded in 1905. It devoted attention to forest statistics and to international co-operation in forestry matters. The first world forest congress was held on its initiative and under its direct management. Dates and location are:—

1st Congress, Rome, 20th April to 5th May, 1926 (58 States represented). [This congress recommended setting up a Forestry Bureau within IIA, but only a statistical section materialized.]
2nd „ Budapest, 10th to 14th September, 1936 (26 States represented).
3rd „ due to be held 1st to 5th July, 1940, at Helsinki. The United Nations Food and Agriculture Organization (FAO), which succeeded IIA, has recommended that it be convened as soon as possible.

INTERNATIONAL FORESTRY CENTRE.

At the 1936 Budapest Congress a new international organization was set up, the Comité International de Sylviculture (CIS). Except for statistical services, which were left with its parent institution IIA, its principal objective was to perform for forestry the same functions as IIA performed for agriculture. It was inaugurated on 11th May, 1939, with headquarters at Berlin. By 1940, 18 States had declared their adherence, but no truly international sessions were held owing to the War. In 1946 its functions were taken over as part of the Forestry and Forest Products Section of FAO at Salzburg.

INTERNATIONAL UNION OF FOREST RESEARCH ORGANIZATIONS.

The initiative in forming an international union of forest research stations was taken at the International Agricultural and Forestry Congress held at Vienna in 1890, and it was founded at Badenweiler in 1891. Meetings, rather limited in scope, were held in 1893 at Mariabrunn-Wien, 1896 at Braunschweig, 1900 at Zürich, 1903 at Mariabrunn, 1906 at Stuttgart, 1910 at Brussels, and the 7th planned for Hungary in 1914 was stopped by War. In 1921 the International Union was reorganized at a congress in Stockholm, with a permanent Secretariat-General and an Executive Committee.

The most recent meetings were held:—

8th Congress, Nancy, 4th to 11th September, 1932.
9th „ Budapest, 10th to 14th September, 1936.
10th „ due to be held at Helsinki in 1939 or 1940.

INTERNATIONAL COMMITTEE FOR WOOD UTILIZATION.

The promotion of conferences dealing primarily with the utilization side was one activity of the Comité International du Bois (CIB). This organization started with headquarters in Vienna in 1932. In 1935 France initiated an autonomous division of CIB, which held annual wood utilization conferences. In 1938 the headquarters were transferred to Brussels, but were closed by the Gestapo after the German invasion of Belgium. It now maintains an office in Geneva. The conference dates are:—

1st Congress, Paris, July, 1935.
2nd „ Paris, 31st March to 3rd April, 1936.
3rd „ Paris, 26th to 28th July, 1938.

INTERNATIONAL CONGRESS ON THE RATIONAL EXPLOITATION AND UTILIZATION OF TIMBER.

Convened by the provisional Government of France in connexion with an international timber exhibition, and held at

Paris, 23rd to 28th September, 1946 (13 States represented).

FAO TECHNICAL COMMITTEE ON FORESTRY AND PRIMARY FOREST PRODUCTS.

A conference of the United and Associated Nations on food and agriculture was held at Hot Springs, May to June, 1943 (44 States represented). It recommended the setting up of a permanent organization in which, however, forestry was not specifically distinguished. At subsequent meetings of the Interim Commission a Forestry Committee was formed, which worked at Washington during 1944-45, and drew up two main reports. When the UNFAO was formally constituted it included a Forestry and Forest Products Division, and Technical Committees have been set up at its annual conferences.

1st Conference of the permanent United Nations Organization for Food and Agriculture (FAO) in Quebec, 16th October to 1st November, 1945.
2nd „ of FAO in Copenhagen, September, 1946.

C. F. C. B.

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CHAMPION, H. O. Forestry in the Food and Agriculture Organization. *Emp. For. J.*, 24, 1945 (131–5).

FRAUENDORFER, S. VON. Internationale Probleme der forstlichen Dokumentation. *Allgemeine Forst. u. Holzwirtschaftliche Zeitung*, 57, 1946. 5/6 (20 pp.)

KOTOK, E. I. Memoranda submitted at an informal meeting of Experts on Statistical, Scientific and Technical Information Services, London, 1946.

PETRINI, S. Det internationella samarbetet på det skogliga området. *Svenska SkogvFören. Tidskr.* 36, 1938 (1–28).

WALDBOTT, BARON K. Die Geschichte der internationalen Zusammenarbeit auf forstlichem Gebiet. *The Foundation of the International Centre of Silviculture, CIS*, 1939 (3–7).

ABSTRACT SECTION

NOTE.—A capital letter in square brackets following the reference denotes the language in which the paper is written. A small letter denotes a summary in another or the same language, e.g. [G.e.]—German, with English summary. English [E.] is only indicated for papers published in journals usually written in foreign languages.

The term "billion" used in papers originating in North America means a thousand million.

0. GENERAL FORESTRY

01. BIBLIOGRAPHY. MATHEMATICAL AND STATISTICAL ANALYSIS

[1557]. 01.6. BEDINGTON, H. M. [Compiler]. **Some British books on agriculture, nutrition, forestry and related sciences, 1939–45.** *Joint Publ. imp. agric. Bur.* No. 11, 1946. pp. v + 36.

[1558]. 01.7. GOULDEN, C. H. **Methods of statistical analysis.** John Wiley & Sons, Inc., New York. Chapman & Hall, Ltd., London. 1939. pp. vii + 277. Price 20*s*.

02. DICTIONARIES

[1559]. 02.4. **Forestry-timber-lumber: French-English vocabulary of terms used in operations.** *Rev. int. Bois* 13 (107–8), 1946 (117–22).

[1560]. 02.4. ARO, P., ILVESSALO, Y., LAITAKARI, E., and LINDFORS, J. Suomalais-Ruotsalais-Saksalais-Englantilainen Metsäsanakirja. **[Finnish-Swedish-German-English Forest Dictionary.]** Kustannusosakeyhtiö Otava, Helsinki. 1944. pp. 38 + [174] + 53 + 67 + 67 + 8. [Finnish with equivalents in remaining languages; separate indexes to the latter and to Latin names.]

04. MAPS

[1561]. 04.4 (51) : 12.19 : 12.25. **Map showing general location of Chinese softwoods of commerce in China proper.** *Spec. Bull. For. Prod. Lab., Kaiting, China* No. 43, 1945. p. 1. [Chin.E.]

[1562]. 04.4 (51) : 12.19 : 12.25. **Map showing general location of Chinese softwoods of commerce in Manchuria.** *Spec. Bull. For. Prod. Lab., Kaiting, China* No. 43, 1945. p. 1. [Chin.E.]

05. PERIODICALS

05.3. *Annual Reports*

[1563]. 05.3 (54 : 59.1) : 07.2. INDIA AND BURMA. **Forest research in India and Burma, 1943–44. Part I. The Forest Research Institute.** Forest Research Institute, Dehra Dun. 1944. pp. 159.

[1564]. 05.3 (66.4). SIERRA LEONE. **Report on the forest administration of Sierra Leone for the year 1945.** Govt. Printer, Freetown. 1946. pp. 14.

[1565]. 05.3 (68.9). NYASALAND. **Annual report of the Forestry Department for the year ended 31st December, 1945.** Govt. Printer, Zomba. 1946. pp. 16.

[1566]. 05.3 (71.4). QUEBEC. **Report of the Minister of Lands and Forests of the Province of Quebec for the year ending March 31st, 1944.** King's Printer, Quebec. 1945. pp. 157.

[1567]. 05.3 (729.7). TRINIDAD AND TOBAGO. **Administration report of the Conservator of Forests for the year 1945.** Govt. Printer, Trinidad and Tobago. 1946. pp. 4.

[1568]. 05.3 (74.4). MASSACHUSETTS. **Massachusetts Agricultural Experiment Station: annual report for the period ending June 30, 1944.** *Bull. Mass. agric. Exp. Sta.* No. 417, 1944. pp. 78.

[1569]. 05.3 (88.1). BRITISH GUIANA. **Report on the Forest Department for the year 1945.** Forest Department, Georgetown, Demerara. 1946. pp. 7.

[1570]. 05.3 (931). NEW ZEALAND. **Twentieth annual report of the Department of Scientific and Industrial Research.** Govt. Printer, Wellington. 1946. pp. 110.

[1571]. 05.3 (94). AUSTRALIA. **Nineteenth annual report of the Council for Scientific and Industrial Research, for the year ended 30th June, 1945.** Commonwealth Govt. Printer, Canberra, 1945. pp. 164.

[1572]. 05.3 (94). AUSTRALIA. **Annual report for the year 1945–46: Division of Forest Products, Council for Scientific and Industrial Research.** Forest Products Laboratory, 69–77 Yarra Bank Road, South Melbourne. 1946. pp. 48.

[1573]. 05.3 (942). SOUTH AUSTRALIA. **Annual report on the operation of the Woods and Forests Department for the year 1944–45.** Govt. Printer, Adelaide. 1946. pp. 14.

[1574]. 05.3 (945). VICTORIA. **Forests Commission of Victoria, Australia: twenty-sixth annual report: financial year 1944–45.** Govt. Printer, Melbourne. 1945. pp. 35 + maps.

06. CONFERENCES

[1575]. 06.2 (54) : 8 : 90. INDIA. **Proceedings of the 1st Senior Forest Officers' Conference held at Dehra Dun from 5th to 7th April, 1945.** Department of Agriculture, Government of India. 1946. pp. iv + 115.

Fourteen senior officers constituted the conference which discussed the resolutions of the 1945 Silvicultural Conference, and a number of items, mainly connected with post-war plans and the training, pay and conditions of the Forest Service. It was unanimously agreed that the creation of an independent Central Federal Forest Service for India was not practicable.

09.1. *Forest History*

[1576]. 09.1 (54–2) : 35 : 60.31. FORD-ROBERTSON, F. C. **War comes to the Doon forests. (A postscript.)** *Indian For.* 72 (6), 1946 (255–67). [Fuel and Transport Circle, United Provinces.]

An account of the effects of war-time exploitation on the Doon forest reserves, United Provinces, some 300 sq. miles of generally compact forest (much of it under *Shorea robusta*) which had been under regular management for nearly 70 years and under working plans for over 50. After a brief survey of the various working plans, the author outlines the general strategy of exploitation adopted in the early stages of the war in an effort to protect the main structure of the elaborate and costly working plan against a huge timber demand, a strategy which later broke down. In addition to sawtimber of various kinds, large quantities of wood were required for sleepers, transmission poles, charcoal and fuel. Data are given for sawtimber, sleeper, and fuel production for the years 1939 to 1945. In the latter part of the war, timber production decreased somewhat, but fuel production continued to rise. The large-scale utilization of forest waste almost completely eliminated the longicorn, *Hoplocerambyx spinicornis*, from the Sal forests.

Reference is made to labour and transport difficulties and to the special measures taken to minimize the danger of fire. The new fire-approach or fire-control roads played an important secondary rôle in opening up less accessible areas to exploitation.

The end of the war found the Doon forests depleted of their finest trees, but cleared of much ancient lumber, remarkably little in arrears with cultural operations, and in better shape for fire-protection and export than at any time in their history.

[1577]. 09.1 (922) : 66 : 23.24 : 46. HERINGA, P. K. Eenige aantekeningen over de bosschen en het boschwezen op Java van December 1941 tot April 1946. **[Notes on forests and forestry in Java from December 1941 to April, 1946.]** *Tectona* 36 (1), 1946 (8–18). [Du.e.]

Teak fellings in Java in 1942 and 1943 were 50 and 100 per cent. higher than the normal permissible cut. In 1944 almost all Teak over 80 years old was girdled, as well as that 40–80

years old in some forest districts of central Java. Overcutting of other species, for firewood and timber, especially Mangroves [*Bruguiera* and *Rhizophora* spp.] and Wattle (*Acacia decurrens*), was even more severe. Much damage was done in the woods through theft by irresponsible sections of the population after the invasion: timber sheds and houses were also broken down and robbed.

Planting of Teak, Balsa and Wattle was increased, but it is as yet uncertain how much of these and older plantations will succeed in view of difficulties in supervision.

Almost all Dutch forest officers were interned and replaced by Indonesians, and revision of working plans stopped. *From author's summary.*

09.2. *Pre-history. Pollen Analyses, etc.*

[1578]. 09.2 (41.1–4). BLACKBURN, K. B. **On a peat from the Island of Barra, Outer Hebrides. Data for the study of post-glacial history. X.** *New Phytol.* 45 (1), 1946 (44–9). [King's College, Newcastle-upon-Tyne.] O.B.D.

Non-tree pollen and spores show extremely high values throughout the diagram, although in the middle there were clearly many more trees than at present. The tree-pollen diagram shows consistently high values for Birch and Hazel. Pine is fluctuatingly high in the earlier periods, and Alder, having reached a high figure, remains at 40–50 per cent. throughout. Elm and Oak reach a maximum of 20 per cent., the one early, the other late in the profile. *From author's summary.*

[1579]. 09.2 (47.9) : 31.1. YATSENKO-KHMELEVSKI, A. A., and KANDELAKI, G. V. Drevesnŷe ugli iz raskopok Beshtashenskoy tsiklopicheskoy kreposti (Tsalka). **[Charcoals from excavations at the Beshtasheni cyclopean fortress (Tsalka).]** *Soobshcheniya Akademii Nauk Gruzinskoy SSR* 2 (5), 1941 (442–8). [Russ.georg.]

Of two samples dated about the middle of the third millennium B.C. both yielded *Alnus* (? *incana*), *Fagus orientalis* and *Quercus* sp.; in addition, one contained *Betula* (*litwinowii*?) and *Pinus hamata*, the other *Abies nordmanniana*, *Fraxinus* sp. and ? *Ostrya carpinifolia*. A further, larger sample of the second half of the second millenium B.C. consisted (percentages in brackets) of *Quercus* sp. (45), *A. nordmanniana* (30), *F. orientalis* (25). The nearest forest is now 30 km. to the north, but it is probable that woodland formerly existed round the site, probably as stunted growth (most samples had narrow rings and the site is at about 2,000 m. altitude) in ravines, etc. which were probably deforested by man.

[1580] 09.2 (47.9) : 31.1. GUMMEL', Ya. I., YATSENKO-KHMELEVSKI, A. A., and KANDELAKI, G. V. Drevesnaya rastitel'nost' goroda Gandzhi v epokhu Nizami Gandzhevi (XII vek n.e.). **[Woody vegetation of the town of Gandzhi in the time of Nizami Gandzhevi (12th century A.D.).]** *Soobshcheniya Akademii Nauk Gruzinskoy SSR* 2 (8), 1941 (733–40). [Russ.georg.]

Various excavations in and near Staraya Gandzhi (cf. following abstract) have yielded material of the following woody species: *Pinus eldarica*, *Ulmus glabra*, *Zizyphus vulgaris*, *Rhus coriaria*, ? *Alnus* sp., *Platanus orientalis* and *Juglans regia*. In the 12th century, as now, woody natural vegetation was probably scanty and the climate is believed to have been about the same.

[1581]. 09.2 (47.9) : 31.1 : 12.25. YATSENKO-KHMELEVSKI, A. A., and KANDELAKI, G. V. El'darskaya sosna v okrestnostyakh goroda Gandzhi v XII veke n.e. **[Eldarian Pine in the neighbourhood of the town of Gandzhi in the 12th century A.D.]** *Soobshcheniya Akademii Nauk Gruzinskoy SSR* 2 (6), 1941 (543–50). [Russ.georg.]

Fragments of wood and charcoal from the ruins of Staraya Gandzhi, near Kirovabad, Azerbaijan, are identified as *Pinus eldarica* Medw., a segregate of *P. halepensis sensu lato*, now restricted in the wild state to about 2,000 trees on the slopes of El'dar-oglŷ on the right bank of the Yora in eastern Georgia. It is argued that the Gandzhi remains must have been derived from stands in the immediate neighbourhood of the old city and that these were probably destroyed by man.

[1582]. 09.2 (74). DEEVEY, E. S. **Additional pollen analyses from Southern New England.** *Amer. J. Sci.* 241 (12), 1943 (717–52). O.R.S.

Fifteen new pollen profiles from 14 lakes and bogs in southern New England confirm the

series of vegetational-climatic periods previously worked out for the New Haven area, but with some minor differences which are described in detail.

[1583]. 09.2 (945) : 12.26–8. CHAPMAN, F., and COLLIVER, F. S. **Notes on fossil leaves of *Eucalyptus* from Bulla and Daylesford.** *Vict. Nat.* 62 (3), 1945 (44-6). O.R.S.

[1584]. 09.2 : 12.25. BUELL, M. F. **Size-frequency study of fossil Pine pollen compared with herbarium-preserved pollen.** *Amer. J. Bot.* 33 (6), 1946 (510–5). O.B.D.

Fossil pollen grains of *Pinus* fail to swell to the same extent as similarly-treated herbarium-preserved pollen. The method of preparation used has a very important effect on the size of both modern and fossil pollen, and a uniform method of preparation is essential if size is to be employed as a characteristic for identification.

09.4. *Forest Statistics*

[1585]. 09.4 (489) : 35. GRØN, A. H. Le Danemark forestier pendant la guerre. **[Danish forests during the war.]** *Rev. int. Bois* 13 (111), 1946 (128–30). [F.]

Danish forests were considerably over-cut during the war for the provision of firewood and producer gas. During the period from the spring of 1944 until May, 1945, the Germans requisitioned about 400,000 cu.m., chiefly from Jutland and mainly in the form of poles for the construction of barbed-wire defences, tank traps, etc. Owing to passive resistance by the Danes only about 40 per cent. of the enemy's demands were supplied, but at the cost of clear-felling a considerable area of Spruce plantations aged 30–40 years. In 1941 the compulsory cut in private forests was raised to 170 per cent., and that in State forests to 200 per cent. of the average pre-war cut; and this was repeated in subsequent years, until 1945–46, when the cut in private forests was reduced to 150 per cent. of normal. In 1938 the extent of Danish forests was about 360,000 ha., of which about 90,000 ha. was protective forest on sand dunes and heaths, with a very low yield of about 1 cu.m. per ha. annually, so that the productive area was about 270,000 ha. The present area of productive forest is estimated at about 260,000 ha. and that of protective forest at about 85,000 ha. In 1938, the total cut in Danish forests was about 1,800,000 cu.m., made up of 750,000 cu.m. of timber and 1,050,000 cu.m. of firewood. About 50,000 cu.m. of the firewood came from the protective forest on the dunes. Thus the cut on the real forest area was on an average 6·5 cu.m. per ha. per annum, whilst the average annual increment was about 7·0 cu.m. As a result of the increased compulsory cut during the war years, the annual cut exceeded annual increment by about 500,000 cu.m., thus reducing, in some degree, not only the growing stock but also the current annual increment. It is important, therefore, that the annual cut should, at the earliest opportunity, be considerably reduced for a number of years in order to compensate for the wartime losses. It is, however, doubtful whether economic considerations will make possible more than a reduction of cut to equal increment. The price of unconverted hardwood timber has risen only 15 per cent.; Beech building timber 40 per cent.; softwood timber 45 per cent.; while wages of forest workers have risen 90 per cent. and the cost of administration, taxes, etc. 60 per cent.; so that very few private owners of forests can afford any great reduction in the annual cut.

The total domestic consumption of wood, calculated as standing timber in the round, is normally about 4 million cu.m. per annum, of which half is produced at home and half imported.

[1586]. 09.4 (71) : 09.7 : 33 : 35 : 94. **Statistical record of the forests and forest industries of Canada** (Revised). Dominion Forest Service, Ottawa, Canada. 1946. pp. [iv] + 22 + tbls.

An earlier edition of this booklet, published in 1943 [cf. *For. Abstr.* 5 (86)], included statistics on the forests and forest industries of Canada from the earliest years for which comparable records were available. In the present edition the various statistical series are given from 1926 to 1944, and sufficient space has been left below the individual tables to permit entries for future years, if these should be desired.

[1587]. 09.4 (75.7) : 09.7 : 12.19.2. WIESLANDER, A. E., and JENSEN, H. A. **Forest areas, timber volumes and vegetation types in California.** *For. Surv. Release*

Calif. For. Range Exp. Sta. No. 4, 1946. pp. 66.

The figures given in this bulletin represent the situation as at 1st January, 1945. They are preliminary and will be replaced by those from the Nation-wide Forest Survey when that is completed for California. In addition to the various tables, there are fairly full notes on the procedure used in their construction.

09.7. *Monographs of Individual Forest Regions*

[1588]. 09.7 (51) : 33.52. TANG, Y. **Survey of forest resources for railway sleepers in southwestern China.** Forest Survey Commission, Kaiting, China. 1943. pp. 44 + tbls. + maps. [Chin.e.] *Abstr.* in *Forest Products Laboratory: a brief account of its plan and works with abstracts of some publications (September, 1939–December, 1944).* National Bureau of Industrial Research, Ministry of Economic Affairs, Kaiting, China. 1945.

[1589]. 09.7 (59.1) : 09.1 : 90. BARKER, A. N. **The forest position in Burma—January, 1946.** *Emp. For. Rev.* 25 (1), 1946 (36–41).

A brief review of the state of the forests, forest administration, etc. in Burma at the present time, and the measures taken to get them into working order. In general, the damage to the forests is not great, but the railways and roads are in very bad repair, and this, together with shortage of both European and Burman staff, is making recovery slow and difficult.

[1590]. 09.7 (63) : 11.12.19 : 3 : 9. LOGAN, W. E. M. **An introduction to the forests of Central and Southern Ethiopia.** *Inst. Pap. imp. For. Inst.* No. 24, 1946. pp. 65 + index + map. [Forest Department, Gold Coast.]

There is little or no reliable information about the forests of Ethiopia at present available, and these notes, compiled by the author as a result of travels in Ethiopia on military service during the war, are necessarily general in outline and limited in scope; they are confined to the central and southern part of the country. Part I deals with the environment, Part II with the distribution, ownership, types and utilization of the forests, and Part III with the conservation of soil and supply of forest produce and suggestions of policy for the future. The appendices include meteorological tables, lists of principal species, notes on economic species, and a list of sawmills in Ethiopia.

[1591]. 09.7 (83) : 3. **Agricultural, pastoral and forest industries in Chile.** U.S. Tariff Commission, Washington. 1945. pp. 47.

[1592]. 09.7 (87) : 3. **Agricultural, pastoral and forest industries in Venezuela.** U.S. Tariff Commission, Washington. 1945. pp. 27.

1. FUNDAMENTAL NATURAL LAWS OF THE FOREST

11.1. *Atmosphere*

[1593]. 11.1 (944) : 11.2 : 12.19.2 : 21. [BEUZEVILLE, W. A. W. DE.] **The climatological basis of forestry, New South Wales. Part 1.** Forestry Commission, New South Wales. 1946. pp. 62 + map. [Commonwealth Rural Reconstruction Commission.]

Schedules showing world stations with climatic affinities in Australia, and the locality of Australian homoclimes, based on E. H. F. Swain's Climatic Index (1938), with notes on the distribution of forest types and species in New South Wales.

11.4. *Soil*

[1594]. 11.4 (496) : 11.2 : 12.19.2 : 12.19.3. IRMAK, A. Belgrat Ormani toprak münasebetleri. **[Research on soil conditions in the Turkish instructional Forest of Belgrad [near Constantinople].]** *Çalişmalar. Yüksek Ziraat Enst., Ankara.* No. 70, 1940. pp. 52 + 58 + plates + figs. [Turk.turk.G.g.]

With chapters on orography and geology, climate, vegetation, physical soil properties, humus conditions, soil morphology (profiles and profile types), and a brief review of the silvicultural significance of the findings, the

chief emphasis being laid on the importance of maintaining soil cover to prevent erosion and soil compaction. [Cf. *For. Abstr.* 8 (No. 1693).]

[1595]. 11.4 (81) : 23.3. SETZER, J. O reflorestamento em face do estudo moderno do solo. [**Reafforestation in relation to modern soil study.**] *Bol. Agric., S. Paulo* Ser. 42, 1941 (385–96). [Port.] I.I.E.

A discussion of (1) soil depth; (2) water-retention capacity and soil porosity; (3) organic soil contents; and (4) degree of soil acidity, with particular reference to afforestation and soil conservation.

[1596]. 11.4 (941) : 23.22.1 : 21.0 : 12.25. O'DONNELL, J., and LOCKHART, W. **Soils of the Keenan Plantation. A soil survey of the Keenan Pine Plantation (at Margaret River, Western Australia.)** *Aust. For.* 9 (2), 1945 (60–8).

A survey was made of part of the plantation in 1936; the major characteristics of the main soil types are described, and the results of mechanical and chemical analyses are given in tabular form. Planting of both *Pinus radiata* and *P. pinaster* had previously been done on burnt and cleared land with no initial cultivation, but as a result of unsatisfactory development on some of the soil types (mainly sandy loam with gravels) a trial area of 5 acres was thoroughly ploughed and replanted. The remarkable response to cultivation on this and a similar plot in the following year led to the adoption of ploughing before planting as standard practice.

11.42. Soil Chemistry

[1597]. 11.42 : 11.44 : 12.11.11. GUTSCHICK, V. Untersuchungen über den Umlauf des Mangans und Eisens im Walde. [**Research on the manganese and iron cycles in the forest.**] *Thar. forstl. Jb.* 91, 1940 (595–645). [G.g.]

Foliage of trees (Norway Spruce, Scots Pine, Beech) and of plants of the ground flora, contained considerably more Mn than Fe. Confirmation was obtained of the increase in the Mn content of shade needles with increasing age of needles, and of the higher Mn content of shade needles as compared with light needles of the same tree. Foliage of shaded young growth of Beech and Pine was also richer in Mn than the assimilating foliage of old trees on the same site. The Fe content of foliage showed much less variation than the Mn content. Both Mn and Fe appear to have little capacity for translocation, remaining for the most part in the foliage when it is shed. Comparatively large amounts of Mn, but only traces of Fe, are involved in the cycle of materials; hence litter and humus generally enrich the topsoil in Mn and reduce its Fe content.

Mn exchange was greatest in very acid soils (below pH 4·5), decreased with decreasing acidity, and ceased at pH 8. Total Mn content, as well as pH, determined Mn exchange in acid soils, but in basic soils a high Mn content was not capable of promoting exchange. Under otherwise like conditions, Mn exchange increased with increasing admixture of humus, decreased with increasing clay or lime content (finer soil texture), and increased—in both acid and basic soils and in both upper and lower soil layers—after wetting for several days.

The determining factor for Fe exchange was soil texture, exchange being greatest in sandy soils and lowest in clay-loams. Comparatively ready replacement of Fe in the organic soil constituents is unimportant since the latter are very poor in Fe in comparison with all horizons of the mineral soil. Fe exchange was little affected by pH and unaffected by the total Fe content of the soil. Exchangeable Mn in the soil was higher on the average, but was variable between far wider limits, than was exchangeable Fe. Under conditions favouring exchange, Mn—chiefly in the humus colloids—is more readily removed from the upper soil and is kept in better circulation, though more liable to leaching and transfer to deeper soil layers, than is Fe, which is contained chiefly in the mineral soil. Humus is the most important source of Mn for forest vegetation. The ground flora, as well as trees, plays an important part in the Mn cycle and in preventing the leaching of this element.

11.43. Biology of Soil, including Mycorrhiza

[1598]. 11.43. GALLEGO Y QUERO, F. Compendio de microbiologia del suelo. Primera parte: procesos biologicos del suelo.

[Compendium of soil microbiology. Part 1: Biological soil processes.] [*Publ.*] *Inst. for. Invest. Exp., Madrid* 14 (29), 1943. pp. 138. [Span.]

[1599]. 11.43.2 (75.6). PEARSE, A. S. **Observations on the microfauna of the Duke Forest.** *Ecol. Monogr.* 16 (2), 1946 (127–50).

In the Duke Forest, 48 collections were made each month for a year: 12 each from Oak and from Pine stands on sand and on clay. From the 576 samples collected, 353,026 animals were recovered, an average of 1,719 per sq. ft. each week. An average of 65 per cent. of the animals were recovered from litter, 30 per cent. from a depth of 0–2 in., and 5 per cent. from a depth of 2–5 in. Details are given of the species collected. Soil moisture appeared to be more effective in controlling the number of animals present than variations in temperature or hydrogen-ion concentration. No significant differences were found between the populations of Oak and Pine or sand and clay, though particular species were often more abundant in one type than in another. Food relations of litter and soil animals are discussed. The most numerous animals in litter and soil feed on litter, fungi, disintegrating plant remains, and faeces. *From author's summary.*

11.44. Surface Humus

[1600]. 11.44. FREI, E. Eine Klassifikation von Wald- und Freilandhumus auf morphologischer und chemischer Grundlage. **[A classification of forest and non-forest humus on a morphological and chemical basis.]** *Schweiz. Z. Forstw.* 97 (10), 1946 (413–31). [G.f.]

The primary division is by degree of saturation, into *mor* (acid) and *mull* ('mild') *groups*, each of which is divided by mode of origin into three parallel *subgroups*, viz. *raw-humus* (comparatively poorly decomposed, being formed under conditions of limited biological activity) in four types by degree of decomposition, *coprogenous* (formed under the mainly mechanical influence of a very active soil fauna) and *chemogenous* (formed under chemical and colloid-chemical influences of bacteria, fungi, soil factors involving oxidation, etc.). Further subdivision is (*a*) by mineral content, into *holorganic* (entirely organic except for adsorbed ions and the original ash content of the plant materials, i.e. with a total ash content not exceeding 20 per cent.) and *hemiorganic* (ash content more than 20 per cent.) *facies*, the latter being subdivided according to the intimacy of the combination of organic and inorganic constituents; (*b*) by texture, into *colloidal*, *granular*, *fibrous* and *laminated forms*, each with 3 subforms.

This scheme, which is presented in tabular form, distinguishes 18 different humification classes for Switzerland. The divisions and subdivisions have been allotted letters and numbers which can be used to characterize a given humus type in a formula, e.g. a coarse-fibrous acid raw humus is expressed in this notation as G2, U1b, F1, M3a.

Examples are given of the more important types and there are 20 micro-photographs illustrating morphology.

[It may be noted that this classification does not equate mor with raw humus, e.g. a 'mild raw humus' appears among the mull types and mor covers 'acid raw humus', 'coprogenous mor' and 'chemogenous mor'.]

[1601]. 11.44 (77.1). GYSEL, L. W. **The forest humus layers of Ohio.** *Soil Sci.* 60, 1945 (197–217). [Ohio State Univ.] O.R.E.

The author describes and classifies the forest humus layers of Ohio in relation to certain environmental factors, mainly topography, mineral soils, and vegetation, and indicates the more important physical and chemical properties of such soils.

[1602]. 11.44 : 12.21. MELIN, E., and WIKÉN, T. **Antibacterial substances in water extracts of pure forest litter.** *Nature, Lond.* 158 (4–6), 1946 (200–1). [Institute of Physiological Botany, Univ. of Uppsala.]

Tests were carried out by means of a modified form of the cylinder-plate method to determine the antibiotic power of cold water extracts made from pure litter of *Acer platanoides*, *Betula verrucosa*, *Fagus sylvatica*, *Fraxinus excelsior*, *Populus tremula*, *Quercus robur*, *Ulmus glabra* and *Glyceria maxima* against *Staphylococcus aureus* No. 266. Only the litter extracts of *Acer platanoides* and *Quercus robur* showed effective antibiotic activity against *Staphylococcus* under the conditions of the assay method used. The antibacterial activity of extracts from litter of *Acer*

platanoides is rather high as compared with that from litter of *Quercus robur*. The quantities of antibiotic substances present in the latter are sometimes not large enough to be detected by means of the cylinder-plate method.

11.47. Maintenance of Favourable Soil Conditions

See also *For. Abstr.* 8 (Nos. 1634, 1727).

[1603]. 11.47.1 : 07.7. BEILMANN, A. P. **The liquid feeding of trees.** *Trees, Cleveland (Ohio)* 6 (6), 1946 (9–10).

Account of a 'liquid feeding gun' developed by the author for supplying nutrients in liquid solution to trees in the Middle West of the United States, where the long droughts of the growing season make the application of dry fertilizers useless. The implement drills holes by hydraulic pressure and then pours the liquid fertilizer into them. A rule of thumb for calculating amounts to be applied is height in ft. + branch spread in ft. + girth of trunk in inches = lb. of fertilizer required. About 1–2 gallons of water are required to 1 lb. of fertilizer.

[1604]. 11.47.1 : 23.26.4 : 11.43. WILDE, S. A., and KRUMM, C. J. **Allowable concentration of commercial fertilizer salts in composts used in forest nurseries.** *J. For.* 44 (9), 1946 (662–5).

The effect of concentration of commercial fertilizer salts in nursery composts upon micro-organisms and higher plants was studied, using direct counts of bacteria and fungi, the Cunninghamella plaque method, and pot cultures with buckwheat and *Pinus resinosa*. The results indicate that 50–60 lb. of total fertilizer salts per cu. yd. of composted organic matter is an average desirable concentration. Composts carrying less than 25 lb. of salts per cu. yd. were found to be uneconomical. Composts with a concentration of salts exceeding 80 lb. per cu. yd. suffer considerable losses of nutrients, especially potash, by leaching, may become unbalanced, and present danger of chemical injury to nursery stock. *Author's summary.*

[1605]. 11.47.13 (43.1–5). AUEROCHS, G. Beurteilung des Kalkbedarfes von Waldböden im mittelfränkischen Keupergebiete. **[Determination of the lime requirement of forest soils in the Middle-Franconian keuper (red marl) region.]** *Forstwiss. Cbl.* 62 (12), 1940 (266–83). [G.g.]

[1606]. 11.47.13 : 23.26 : 12.25. MASSACHUSETTS. **Massachusetts Agricultural Experiment Station: annual report for the period ending June 30, 1944.** *Bull. Mass. agric. Exp. Sta.* No. 417, 1944. pp. 78.

Carolina and Canadian Hemlock grew better with light than with heavy applications of complete fertilizer. More new growth was obtained from $\frac{1}{3}$ to $\frac{1}{2}$ ton per acre of 5–8–7 broadcast among the plants than from one ton or more used in the same way. The heavier application in many cases actually injured the plants, which showed stunting, poor growth, or dead tops. Mixed fertilizers such as 10–8–7, which contain a high percentage of nitrogen, produced no more growth than did the 5–8–7 when used at the same rate, and sodium nitrate at 300 lb. per acre caused some injury, indicating that Hemlocks do not need much nitrogen (p. 53).

[1607]. 11.47.13 : 23.26.4 : 12.25. NĚMEC, A. Vliv jednostranného hnojení draselnou solí a kainitem na vzrůst sazenic smrku v lesních školkách. **[The influence of unbalanced fertilizing with potash salt and Kainite on the growth of Spruce stock in forest nurseries.]** *Repr.* from *Sborník Československ. Akad. Zemědelské* 14, 1939 (178–86). [Cz.g.] [Cf. *For. Abstr.* 1 (264).]

[1608]. 11.47.13 : 23.26.4 : 12.25. NĚMEC, A. Vliv jednostranného hnojení draselnou solí a kainitem na výživu sazenic smrku v lesních školkách. I. Vliv hnojení na resorpci drasla a kys. fosforečné. II. Vliv hnojení na resorpci dusíku, vápna a hořčíku. **[The influence of unbalanced fertilizing with potash salt and Kainite on the nutrition of Spruce stock in forest nurseries. I. Influence on K and P_2O_5 absorption. II. Influence on N, Ca, and Mg absorption.]** *Reprs.* from *Sborník Československ. Akad. Zemědělské* 14, 1939 (270–7; 324–31). [Cz.g.]

I. (*a*) *Absorption of K* by the needles depends in general on the K supply in the soil. In the first 3 years of growth the absorption of K was markedly increased on soils supplied with K (K_2O content more than 130 mg. per kg. soil), whereas on soils poor in K but containing over 100 mg. P_2O_5 per kg., fertilizing had no

material effect on K uptake. The same was true of soils poor in P_2O_5 but the threshold for K_2O content was higher (over 17.5 mg. per kg. soil). With 3-year-old Spruce on soils supplied with P_2O_5, fertilizing with 40-per-cent. potash salt gave considerably increased K absorption on soils poor in K but supplied with CaO, as compared with soils poor in the latter. Fertilizing with Kainite was more effective on the soils poor in CaO. On soils poor in P_2O_5, even on those poorest in K, no material increase in K absorption by the needles resulted from unbalanced K fertilizing.

(*b*) *Absorption of* P_2O_5 by needles generally decreased, in both fertilized and unfertilized Spruce plots, with decreasing P_2O_5 in the soil. Only on the soils poorest in K (less than 100 mg. K_2O per kg. soil) was there a moderate increase in the P_2O_5 content of needles after fertilizing with K; in the other cases the P_2O_5 content of needles was slightly reduced. The availability of P_2O_5 in the soil is influenced by the amount of exchangeable CaO: even on soils very poor in K, the P_2O_5 content of needles was not increased by unbalanced K fertilizing if the CaO content of the soil was high.

II. (*a*) *Absorption of N* by the needles depends on the relative solubility of the N in the soil. With a favourable P_2O_5 supply in the soil, fertilizing with K increased N absorption on soils provided with N, especially if the soil was K-deficient. On soils of low relative N solubility the N uptake of needles was reduced by unbalanced fertilizing with either 40-per-cent. potash salt or Kainite.

(*b*) *Absorption of Ca* depends in general on the content of exchangeable Ca compounds in the soil. Unbalanced K fertilizing of soils provided with P_2O_5 reduced the uptake of Ca by needles in the case of soils with a good K supply, but considerably increased it on soils poor in K, especially where 40-per-cent. potash salt was used. Similar results were obtained for soils poor in P_2O_5, but in this case Kainite was the more effective fertilizer. On soils poor in P_2O_5 and K, fertilizing with K gave a closer K_2O : CaO ratio in the needles.

(*c*) *Absorption of Mg* by the needles corresponds roughly to the content of exchangeable Mg compounds in the soil. On soils provided with P_2O_5 but having the lowest K content, a slight increase in Mg uptake by the needles resulted from unbalanced K fertilizing; in the remaining cases no special changes occurred. *From author's summaries.* [For Part III of these studies see *For. Abstr.* 5 (12), where, and in *For. Abstr.* 1 (90), for Pine read Spruce. See also *For. Abstr.* 1 (264).]

11.49. Soil Types

[1609]. 11.49.0 (469) : 11.41.8. AZEVEDO, A. LOBO. Estudo de alguns perfis de solos da Mata Nacional de Leiria—I. **[Study of some soil profiles in the National Forest of Leiria.]** *Agros, Lisboa* 27 (3/6), 1944 (140–9). [Port.]

An analytical study of two forest soils of the podzol group.

[1610]. 11.49.5 (485) : 12.19.2 : 12.19.3 : 64 : 38.62 : 11.14. JUNGSTEDT, B. O. Torvmarkernas gradering och godhetsgrad. **[The grading and quality of peatlands.]** *Svenska SkogsvFören. Tidskr.* 44 (5), 1946 (369–88). [Sw.e.]

In the survey of peatlands on State forest areas S. of lat. 61° N. in Sweden [cf. *For. Abstr.* 8 (No. 645)], a practical system was adopted for grading and mapping land according to drainability and estimated suitability for forest growth when drained. The system is based on the following broad ecological classes: (i) *Sumpskogar* (wet peatland forests), defined as peat-forming, tree-grown associations more or less closed in age, with 3 main types—fen-like, usually with Spruce, Alder and Birch; *sumpskogar* proper, resembling the mossy drier forests with scattered *Sphagnum* and *Polytrichum* cushions; and bog-like, floristically near to the 'suffrutex bogs' (see below). (ii) *Kärr* (fen with few or no trees), consisting of associations on low-lying, watery and often periodically flooded ground, with no moss layer or one consisting of so-called 'brown mosses' [types such as *Amblystegium, Hypnum, Paludella*?] and with tall sedges, *Eriophorum angustifolium*, grasses and herbs, and to a lesser extent low sedges, Willows, suffrutices and shrubs, especially Alder. (iii) *Mossar* (bogs), including (*a*) *starrmossar* (sedge bogs) with a loose mat of weakly hummock-forming *Sphagna*, dominated by *Carices* often accompanied by *Eriophorum angustifolium, E. vaginatum, Scirpus caespitosus, Rhynchospora alba*, with a number of water-loving herbs and some grasses; the better types invaded by Birch and

sometimes even Alder; (*b*) *rismossar* ('suffrutex bogs') with abundant subshrubs such as *Calluna, Empetrum, Vaccinium* spp., *Andromeda polifolia*, and sometimes *Betula nana, Ledum palustre, Erica tetralix, Myrica gale*, with *Sphagnum fuscum* in the moss layer; treeless or with stunted Pine; (*c*) *rena tuvmossar* ('pure hummock bogs'), having an extremely low rate of decomposition, dominated by the hummock-forming *Sphagnum fuscum*, sometimes accompanied by *Eriophorum vaginatum* or *Scirpus caespitosus*. In these classes, site grades are recognized and denoted by combinations of numerals and letters. Grades Ia–Ib/c cover fen-like *sumpskogar* and *sumpskogar* proper, the grades being assessed by species composition, height and vigour of the tree layer. Grades (Ib/c-)Ic–Id include *kärr* and *starrmossar*: the better types (*kärr*) are distinguished by the vigour and luxuriance of the component species and the predominance of the taller *Carices*, e.g. *rostrata, lasiocarpa, vesicaria*, with *Equiseta*, grasses such as *Calamagrostis lanceolata, Agrostis, Glyceria, Phragmites*, and herbs such as *Menyanthes, Caltha, Comarum palustre, Peucedanum palustre et al.*, whereas the poorer show shorter sedges, e.g. *Carex limosa, panicea, goodenowii, canescens, stellulata, pauciflora, dioica*, and in the worst *Rhynchospora alba, Molinia caerulea, Andromeda* and *Erica tetralix* may come in. Grades (Ib/IIa-) IIa-IIa/b cover the bog-like *sumpskogar*, IIb-IIc the *rismossar* and III the *rena tuvmossar*. Suitability for drainage becomes doubtful from IIb downwards and III are regarded as entirely unsuitable.

Results from seven forest districts in different rainfall areas are shown graphically to illustrate the marked increase in the percentage of lower-grade peatland with increasing rainfall, the rise being particularly marked between 750 and 850 mm. of rain annually.

11.6. *Hydrographical Conditions. Water and Soil Conservation*

[1611]. 11.6 (92) : 97.1 : 91.3 : 81. HAAN, J. H. DE. Bodembehoud en watervoorziening. **[Soil conservation and water supply.]** *Tectona* 36 (1), 1946 (19–31). [Du.e.]

The author proposes the establishment of a Land Organization Service for the planning of soil and water conservation in the Netherlands East Indies, discusses the organization and tasks of such a Service and its possible relations to other public bodies concerned with land use, with the conclusion that it should be subordinated, in common with forestry, irrigation, colonization and possibly water power and electricity services, to an independent 'Department for Domain and Water Management'.

[1612]. 11.6 : 91.3. ZON, R. **Forests in relation to soil and water.** *Proc. Amer. phil. Soc.* 89 (2), 1945 (399–402).

Cf. *For. Abstr.* 8 (No. 69).

[1613]. 11.62.1 (56.9). TAYLOR, F. H. **The destruction of the soil in Palestine.** *Bull. Palest. Soil Conserv. Bd.* No. 2 [1945?] Pp. 19 + plates.

A brief account of the general consequences of soil erosion, of early conditions, of soil changes during historical times, of recent damage, and of the measures necessary to stop the soil loss which is now occurring at an accelerated rate in Palestine. Special aspects of land tenure and inheritance and of grazing customs and farming methods peculiar to the region are discussed fully.

[1614]. 11.62.1 (73). LEOPOLD, A. **Erosion as a menace to the social and economic future of the southwest.** *J. For.* 44 (9), 1946 (627–33).

A paper read at a conference in 1922 but not hitherto published. It was one of the first statements by a forester on the magnitude and seriousness of soil erosion in the southwest of the United States, and indicated overgrazing as its direct cause.

[1615]. 11.62.11 (469) : 23.3. GÓIS, E. REIS and GUERREIRO, M. GOMES. As dunas de Mira. **[The dunes of Mira.]** *Agros, Lisboa* 28 (3/4), 1945 (115–22). [Port.]

The successful fixation of sand dunes by afforestation.

[1616]. 11.62.11 (54.2). JOSHI, K. D. **The problem of soil erosion along the Jamna and Chambal ravines in the United Provinces, especially in the Etawah District.** *Indian For.* 72 (7), 1946 (316–7 + plates).

The two main causes of the constant and serious erosion of their banks by the Jamna and Chambal rivers are (1) destruction of river-bank vegetation and uncontrolled grazing and

browsing of the little growth left; and (2) increasing cultivation due to pressure of population. The first cause has be successfully tackled by a policy of controlled grazing, but owing to the 'Grow more Food' campaign, even indifferent soils continue to be brought under the plough. The only method of stopping erosion in river-bank areas (apart from the expensive procedure of 'bunding' ravines and terracing fields) is closure to indiscriminate grazing and the formation of fuel and fodder reserves.

[1617]. 11.62.11 (72) : 23.3 : 23.26 : 21.0. QUEVEDO, M. A. DE. La estación forestal del Puerto de Veracruz y sus enseñanzas. **[The forest station of Veracruz and its work.]** *Méx. for.* 13 (6/9), 1945 (43–50); 14 (1/3; 4/6), 1946 (1–14; 21–8). [Span.]

After a brief general review of forestry work in Veracruz before the formation of the Forest Station, the author discusses the three main aspects of the Station's work: (1) the construction, destruction and reconstruction of an artificial dune designed to shelter the unstable sands; (2) the fixation of shifting dunes through afforestation; and (3) the forest nursery and the experimental propagation of tropical species.

[1618]. 11.62.11 (931) : 23.3. BOOT, V. P. **Erosion control on east coast hills. Trees used successfully on sheep stations.** *N.Z. J. Agric.* 72 (4), 1946 (395–7, 399–403). O.R.E.

The success of the Catchment Boards set up in many parts of New Zealand under the Soil Erosion and Rivers Control Council depends to a large extent on the efforts of farmers to practice anti-erosion measures on their own lands. Details are given of methods successfully employed at Puketite Station, Poverty Bay, during the last 43 years. About 60 acres of the farm are still under bush, and 130 acres of utility plantations have been established, chiefly of Willows, *Eucalyptus* spp., Oaks, *Cupressus macrocarpa*, and *Pinus radiata*. The latter is not a very suitable species from the point of view of the farmer, as it has a marked tendency to self-sow and is said to have an adverse effect on pasture grasses and clovers.

[1619]. 11.62.3 (494) : 38.8. WEHRLI, W. Lebenswichtige Probleme des Valle Maggia: I. Das Wasser-regime des Einzugsgebietes der Maggia. [: II]. Das Problem von Campo. **[Vital problems of the Valle Maggia: I. The water régime of the Maggia catchment. [: II]. The problem of Campo.]** *Schweiz. Z. Forstw.* 97 (7; 11), 1946 (285–95; 497–508). [G.f.] MÜLLER, R. Flussbauliches über die Maggia. **[Notes on stream training in connexion with the Maggia.]** *Schweiz. Z. Forstw.* 97 (7), 1946 (295–306). [G.f.]

Wehrli's two papers constitute the text of a lecture on the question of floods and their control in the Valle Maggia (Ticino) and its tributary the Rovana, with reference to schemes for training works and afforestation. The floods are attributed to the results of deforestation in the middle of the last century, aggravated by the construction of dams for timber-floating operations.

Müller's paper is a more technical summary of hydrological conditions in the valley and the measures necessary for control.

12. FOREST BOTANY. TREE SPECIES

12.1. *General Botany*

12.11. Physiology. Reproduction. Growth

12.11.1. *Metabolism. Plant Constituents. Translocation. Growth Substances*

[1620]. 12.11.1 : 21.0. KURSANOV, A. K., and KRYUKOVA, N. N. Vliyanie geograficheskogo faktora na aktivnost' peroksidazy v rasteniyakh. **[Influence of the geographical factor on peroxidase activity in plants.]** *Biokhimiya* 10 (2), 1945 (97–103). [Russ.e.] [A.N. Bach Institute of Biochemistry, Academy of Sciences of the U.S.S.R., Moscow.] A.P.B.

(1) Peroxidase activity in bark of species of *Salix* and *Betula* and in leaves of conifers of 4 different genera (the enzyme was not detected in those of *Larix sibirica*) was very high in circumpolar regions, considerably lower in the Moscow region and still lower at Tiflis. In bark of *Betula nana* and two species of *Salix*, it also increased, at the same latitude, with increasing elevation.

(2) Willows introduced 6–7 years previously from different regions to a nursery in the Moscow region, showed the same gradation of peroxidase activity according to origin, but the differences were greatly reduced.

The findings are linked in discussion with the higher respiration rates found by other workers for northern plants and the higher activity in the north is regarded as a reaction to an unfavourable environment. That photoperiodism is not directly involved is suggested by (2).

[1621]. 12.11.11 (54). BADHWAR, R. L., NAYAR, S. L., and CHOPRA, I. C. **Indian plants liable to produce dermatitis.** *Indian For.* 72 (8), 1946 (372–88). From *Indian J. agric. Sci.* 15 (3), 1945.

[1622]. 12.11.11 : 12.26–8 : 12.14.5. CHAUVIN, R. Sur la substance qui, dans les feuilles de *Melia azedarach*, repousse les criquets. **[On the substance in the leaves of *Melia azedarach* which is repellent to crickets.]** *C.R. Acad. Sci., Paris* 222 (7), 1946 (412–4). [F.] D.S.I.R.

[1623]. 12.11.11 : 42.5. STILES, W. **Trace elements in plants and animals.** Cambridge University Press. 1946. pp. xi + 189 + plates.

This book presents a digest of existing information and the present state of knowledge of trace elements in living organisms. Chapters deal with the history of these studies, methods of investigating micro-nutrient problems, trace-element deficiency diseases of plants, the functions of trace elements in plants, trace elements in animals. Among the diseases discussed in some detail are 'frenching' of Tung trees (*Aleurites fordii*) due to manganese deficiency; Pecan (*Carya olivaeformis*) rosette, little leaf or rosette of deciduous fruit trees, 'frenching' of *Citrus* spp., bronzing of Tung trees and *Pinus radiata* rosette, all due to zinc deficiency; and exanthema or die-back of fruit trees due to copper deficiency. There is a bibliography of 22 pages.

[1624]. 12.11.12 : 12.25. MACDOUGAL, D. T. **Streaming movements of solutions in plants.** *Amer. J. Bot.* 33 (5), 1946 (318–28). O.B.D.

The author describes the principal features of translocation in *Pinus radiata* and *Sequoia sempervirens*, with anatomical details. The interpretation of the effects of defoliation and girdling of *P. radiata* and *S. sempervirens*, and the process of translocation in hollowed trunks, are discussed. New experimental results support previous observations confirmatory of the cohesion theory of movements of liquids.

[1625]. 12.11.12 : 12.26–8 (62) : 11.62. GREISS, E. A. M. **On the rate of water-conduction in the wood of certain trees in Egypt.** *Repr.* from *Bull. Fac. Sci. Fouad I Univ., Cairo* 25, 1945 (35–54). [E.e.egypt.]

A comparative study of the water conductivity of cuttings taken from woody plants grown in Egypt under irrigation and in dry areas. Test plants included species of *Salix*, *Parkinsonia*, *Schinus*, *Morus*, *Eucalyptus*, and *Acacia*.

[1626]. 12.11.15 : 12.11.21 : 12.14.7. VYVYAN, M. C. **Fruit fall and its control by synthetic growth substances.** *Tech. Commun. imp. Bur. Hort. Plantat. Crops* No. 18, 1946. pp. 72.

The author first considers the whole subject of the loss of potential fruit by premature drop and its causes—environmental and inherent—and the connexion of growth substances with the process of abscission. He reviews the work of widely scattered investigators, work which has concerned many different substances and fruits under widely different conditions, and deduces positive and helpful evidence from their findings and his own experience. He discusses the number and methods of applications desirable, the addition of spreaders and other supplementary substances, the use of growth substances in conjunction with other sprays and their effects on quality of fruit and habit of tree. He tabulates the chief results achieved on named varieties—mainly apple—with named growth substances.

[1627]. 12.11.15 : 12.26–8 : 47 : 34.26. FISHER, E. F. **Manna-formation in *Myoporum platycarpum* R. Br.** *J. Coun. sci. industr. Res. Aust.* 18 (2), 1945 (159–64 + plates). P.R.

Exuding branches of *Myoporum platycarpum* R. Br. showed a complete disappearance of starch and an accumulation of gum and tannin in the medullary-ray and wood-parenchyma cells; while parenchymatous cells containing large quantities of gum and tannin were developed in the phloem to the almost complete exclusion of sieve tubes.

Since mannitol (which constitutes 60–70 per cent. of the total solid content of the exudate)

can be formed from fructose by bacterial action, 3 organisms (a species of yeast, a gram-positive bacterium and a gram-negative bacterium) isolated from the inner bark of exuding trees, were studied. Their morphology, cultural characters, and physiological characters of the bacteria are described. Inoculation experiments with the three organisms and with the inner bark of an exuding tree gave negative results. Evidence suggests that the organisms probably live parasitically on the exudate, and the cause of the exudation remains obscure.

12.11.2. *Reproduction. Propagation. Growth*

[1628]. 12.11.21 : 12.25 : 23.1. SCHANTZ-HANSEN, T. **Winter dissemination of Red Pine seed.** *J. For.*, 44 (8), 1946 (593–4). [Cloquet Forest Exp. Sta.]

The Red Pine cone crop was unusually heavy in the Cloquet Forest in the autumn of 1944, but owing to weather conditions the cones remained unopened until the cold period of January and February. As the distribution of the seed on the snow was very evident, 120 yard-square plots were laid out and the seed counted on each. Dispersal of seed on snow may be important. Under certain conditions, with a hard crust on the snow and a high wind, the spread may be much further than normal. This may explain the occasional establishment of natural regeneration far from a visible source.

[1629]. 12.11.21 : 12.25. LOOBY, W. J., and DOYLE, J. **The gametophytes of *Podocarpus andinus*.** *Sci. Proc. R. Dublin Soc.* 23 (22), 1944 (222–37). O.R.S.

Cf. *For. Abstr.* 8 (No. 1642).

[1630]. 12.11.22 : 12.11.15. MASSACHUSETTS. **Massachusetts Agricultural Experiment Station: annual report for the period ending June 30, 1944.** *Bull. Mass. agric. Exp Sta.* No. 417, 1944. pp. 78.

The fungicides Arasan or Spergon, when added to indole-butyric acid in talc, caused no injury to cuttings of several species, and their use prolonged the life of unrooted Apple cuttings. Cuttings of Hemlock rooted better if taken from the north side of the tree, and better and more rapidly if treated with indole-butyric acid solution followed by a powder dip treatment with indole-butyric acid in talc plus Spergon. Rooted White Pine cuttings grew about 5 in., erect and symmetrical, in their second year. Cuttings of most of the woody plants used rooted better in sand/sedge peat than in sand/sphagnum peat (p. 20).

[1631]. 12.11.22 : 12.26–8. THAKURTA, A. G., and DUTT, B. K. **Vegetative propagation of *Cinchona ledgeriana* from gootes (marcottes) and cuttings by treatment with auxins.** *Sci. and Cult.* 9 (9), 1944 (401–2). L.S.

A treatment with 2-per-cent. indole-butyric acid in lanoline paste for 24 hours before dressing with balls of earth produced vigorous rooting on 88 per cent. of 2- to 3-year-old whole branches of *Cinchona ledgeriana* within 4 months. A treatment of 0·02-per-cent. indole-butyric acid in water solution for 24 hours before planting hard, woody cuttings, produced roots on 20 per cent. of them within 4 months.

[1632]. 12.11.22 : 12.26–8. LARSEN, C. M. Forsøg med Vækststofbehandling af Pilestiklinger. **[Experiments on the treatment of Osier cuttings with growth substances.]** *Dansk Skovforen. Tidsskr.* 31 (9), 1946 (433–48). [Dan.]

In laboratory experiments early in 1945 with woody cuttings of *Salix viminalis*, treated for about 24 hours with various concentrations ($\frac{1}{80}$–$\frac{1}{6}$ per mille) of β-indolyl-acetic and indolyl-butyric acids, the number of roots formed per cutting increased with increasing concentration of either growth substance: both substances, at the higher concentrations, more than doubled the number of roots and greatly increased the rate of root growth as compared with controls, the strongest and most regular effect being obtained with indolyl-butyric acid. Number of shoots per cutting was markedly reduced, especially at the higher concentrations, by indolyl-butyric acid, but β-indolyl-acetic acid had little effect in this respect. Neither substance reduced the rate of shoot growth except at the highest concentrations. Similar effects were observed in a series treated with the proprietary substance Floramon, but the concentrations used (weakest 1 : 120) were all much too strong. With all substances, injuries such as swellings and bark splitting increased with increasing concentration, β-indolyl-acetic acid being the least injurious.

On the basis of these favourable results, field tests were established in April, 1945, to examine possible effects of treatment of cuttings on early growth of the same species, using the same substances at various concentrations. At the middle and end of the first growing season no difference in height growth could be detected between treatments or between these and controls, neither was there any difference in the yield of 1-year-old shoots by weight. Examination of the root systems in spring, 1946, showed no difference in the number of roots per cutting down to root diameters of less than $\frac{1}{2}$ mm., though there were indications that treated cuttings had formed more roots initially.

Failure to show improved growth may be due (*a*) to delay between treatment and planting, as the material was treated and then sent away to planting sites; or (*b*) to the fact that in woody cuttings of Willow and Poplar only a few of the roots initially formed normally develop further.

[1633]. 12.11.23 : 11.1. BEESON, C. F. C. **The moon and plant growth.** *Nature, Lond.* 158 (4017), 1946 (572–3). [Imperial Forestry Bureau, Oxford.]

The only experimental evidence for the existence of lunar influence on the growth of land plants is that published by L. Kolisko. All other investigators in many parts of the world have been unable to discover any consistent correlation between the moon and the vital processes of land plants; some admit that if a lunar effect does exist it is so obscure as to have no value in agricultural or forestry practice.

[1634]. 12.11.23 : 11.1 : 11.47.1 : 01.4. KOLISKO, E., and KOLISKO, L. **Agriculture of to-morrow.** Kolisko Archive, Rudge Cottage, Edge, Stroud, Glos. 1946. 1946. pp. 426 + charts. Price £2 2*s*. 0*d*.

This book interprets in anthroposophical terminology the growth of plants resulting from the interplay of earthly and cosmic forces. From the preface and the foreword it appears that it was nearly completed in 1939 and little has been added since. It is mainly a compilation of experiments conducted by L. Kolisko between 1920 and 1936 at Stuttgart and thereafter in England.

It deals with cosmic influences, the effect of the smallest entities, the preparation of manures and composts, the destruction of pests and an original method termed Capillary Dynamolysis for studying the formative forces in plants and animal excretions, and for diagnosing animal diseases.

The experimental results are lavishly illustrated with 314 graphs and photographs, 4 of which are in colour. Very few of the graphs have quantitative scales or explanatory notes, and for their interpretation one must search the narrative of each experiment. General summaries or specific conclusions are also hard to trace in the text. There is no indication of the extent or significance of the numerical data of the experiments.

The author's earlier research on the effect of the moon on plant growth is recapitulated (see *For. Abstr.* 8 (2), pp. 191, 192) and subsequent subterranean experiments are added. In work on the enlivening of manure and compost heaps the author claims that the elements silica, calcium, sulphur, phosphorus, and iron must be added—not in a mineralized form but in a living process. This is ensured by homeopathic doses of Oak bark, camomile flowers, milfoil flowers, stinging nettles and valerian flowers. The following illustrate the methods recommended:—(*a*) Cow manure buried in one cow horn during winter and mixed in spring with one bucketful of water provides sufficient liquid manure for one acre of land. (*b*) Oak bark, inserted in the fresh skull of a newly-killed domestic animal and buried in soil with running water over it, is added to a compost heap (this also acts as a prophylaxis against plant diseases). (*c*) An extract of Spruce seeds is a deterrent to slugs. (*d*) Weeds and insect pests can be destroyed by burning their seeds or their bodies and scattering the ashes. Finally, peat moss, hop manure, dried blood and some commercial preparations have no value as fertilizers.

12.11.3. *Heredity. Breeding. Races and Questions of Provenance. Cytology*

[1635]. 12.11.3. ASHTON, T. **The use of heterosis in the production of agricultural and horticultural crops.** Imperial Bureau of Plant Breeding and Genetics, School of Agriculture, Cambridge, England. 1946. pp. 30.

The success of hybrid maize in the United States constitutes one of the most far-reaching achievements of plant breeding and genetics during recent years. There is an increasing indication that the systematic use of heterosis in commercial crop production offers important possibilities in other crops, not only in cross-pollinated species but also in self-pollinated. The purpose of this bulletin is to bring together papers which have a bearing on the commercial exploitation of hybrid vigour. No general publication covering the literature on the practical problems of hybrid vigour has hitherto been available.

American plant breeders and geneticists have been foremost in studying the economic possibilities of hybrid vigour. In addition to the development of hybrid maize, they have enriched agricultural science by pioneer work on hybrid vigour in a number of other crops. The bulk of the literature is therefore to be found in various American sources of information. But important papers have also been published on the subject which are less readily accessible; of particular interest are the investigations by Russian plant breeders on heterosis in tobacco.

The bulletin is divided into four main sections, dealing with self-pollinated and cross-pollinated plants, asexually propagated plants and forest trees (*Betula*, *Castanea*, *Juglans*, *Larix*, *Pinus*, *Populus* and *Quercus*). Since maize hybrid production is an established and well-known practice, only papers on certain fundamental problems likely to be of general interest are reviewed.

A bibliography of 234 references is appended.

[1636]. 12.11.3 : 12.25–8 (469). GUERREIRO, M. GOMES. Aspectos actuais da silvicultura: o melhoramento. **[Practical aspects of silviculture: forest amelioration.]** *Agros, Lisboa* 27 (3/6), 1944 (150–7). [Port.]

Portuguese forests have deteriorated owing to excessive fellings, and the encroachment of agriculture during the industrial revolutions of the late 18th and early 20th centuries. The author considers that the remedy lies in better races of trees, particularly of *Populus* and *Pinus*, and proposes extensive fundamental research in methods of vegetative propagation, hybridization, polyploidy, seed selection and allied fields as a preliminary to the production of improved races on a large scale.

[1637]. 12.11.3 : 12.25 : 12.11.21 : 42.5 : 22.12. JOHNSON, L. P. V. **Reduced vigour, chlorophyll deficiency, and other effects of self-fertilization in *Pinus*.** *Repr.* from *Canad. J. Res.* 23C, 1945 (145–9). *N.R.C.* No. 1320.

Seedlings derived from self-pollinations in *Pinus strobus* and *P. sylvestris* were, at four years of age, significantly smaller than comparable seedlings derived from open and intra-specific cross-pollinations. In *P. strobus*, 11 out of 46 seedlings of selfed origin showed pronounced chlorophyll deficiency. Selfing had an unfavourable effect on seed set and seedling emergence in *P. sylvestris* and on seed set in *P. resinosa*. The results are discussed in relation to the occurrence of chlorophyll deficiency in Pine and in relation to the silvicultural practice of seed-tree cutting. It is recommended that, in estimating the numbers of seed trees required to re-seed a cut-over area, silviculturists take into consideration the provision of adequate opportunity for cross-pollination between individuals of the same species. *Author's summary.*

[1638]. 12.11.3 : 12.25. ARNBORG, T. *Pinus sylvestris* f. *condensata*—kvasttallen. **[*Pinus sylvestris* f. *condensata*, the 'Broom Pine'.]** *Svenska SkogsvFören. Tidskr.* 44 (4), 1946 (329–43). [Sw.]

An illustrated account of this form, which is characterized by fastigiate multiple stems (the crown, however, usually broad) formed in youth, and generally fused later into a composite stem, from one to several metres long in old trees. No true main stem is formed. Cone-setting is usually poor and cones small, but no certain differences from type exist in the general morphology of leaves or cones. The form is practically confined to Uppsala and the adjacent counties, but possibly occurs in several Norwegian localities.

Seed from parents in a number of localities was sown in 1942. In the 4-year-old progeny only 23 per cent. had straight, single stems with short branches, 65 per cent. had single stems but long branches, and 12 per cent. had two or more stems. The trial is to continue; it has some practical significance in connexion with the current discussion on the grading of planting stock [cf. *For. Abstr.* 8 (Nos. 208, 1753)], as the differences in seedlings began to show in the 1st to 2nd years.

[1639]. 12.11.3 : 12.26–8. FERGUSON, J. H. A. Individueele boomeigenschappen in de kinacultuur. **[Individual tree characters in *Cinchona* plantations.]** *Nederl. Boschb.-Tijdschr.* 18 (9), 1946 (193–7). [Du.]

A brief note on variation, with main reference to height growth, stem form and branching, in *Cinchona* clones—chiefly clones of *C. ledgeriana* grafted on *C. succirubra* stocks—in the Netherlands East Indies. In some, phototropism is stronger than negative geotropism and the stands consist of stems all leaning in the same direction. One clone (K63) has a propensity for dropping heavy lateral branches in strong wind; after a storm, workmen are directed to plantations of this clone to harvest the bark while it is still moist. Quinine content of the bark, though much affected by environmental factors, is also genetically determined. Resistance to certain insects, e.g. *Helopeltis*, also appears to vary with clone. There is not yet much evidence on the transmission of characters in sexually propagated stock, but there are indications that height growth and quinine content are heritable.

[1640]. 12.11.3 : 12.26–8 (82). Algunas observaciones sobre el álamo híbrido 'Arnaldo Mussolini'. **[Some observations on the hybrid Poplar, 'Arnaldo Mussolini'.]** *Alm. Minist. Agric. Argent.* 20, 1945 (253–5). [Span.] I.I.E.

Qualities and defects of the Poplar hybrid, 'A.M.' (Black or Criollo Poplar × Canadian Poplar) which was introduced into Argentina in 1937 and has since been propagated on a large scale. [Cf. *For. Abstr.* 8 (Nos. 1696, 1704).]

[1641]. 12.11.3 : 12.26–8. CASTRO, D. DE. Nota sôbre o número de cromosomas da *Betula celtiberica* Rothm. et Vasc. **[Note on the chromosome numbers of *Betula celtiberica* Rothm. et Vasc.]** *Broteria* 13 (2/3), 1944 (73–4). [Port.] I.I.E.

12.13. Embryology

[1642]. 12.13 : 12.25 : 12.11.21. LOOBY, W. J., and DOYLE, J. **Fertilisation and early embryogeny in *Podocarpus andinus*.** *Sci. Proc. R. Dublin Soc.* 23 (26), 1944 (257–70). O.R.S.

It is suggested, from a survey of the whole life-history of *Podocarpus andinus* that, in its gametophytes, proembryo, and early embryogeny, it may be taken as a prototype for the whole Podocarpean complex, except for the inequality of the male cells which were probably primarily equal or subequal as in *Saxegothea*. *From authors' summary.* [Cf. *For. Abstr.* 8 (No. 1629).]

12.14. Organography. Morphology. Anatomy. Histology.

[1643]. 12.14.4 : 12.25. GUNCKEL, J. E., and WETMORE, R. H. **Studies of development in long shoots and short shoots of *Ginkgo biloba* L. II. Phyllotaxis and the organization of the primary vascular system; primary phloem and primary xylem.** *Amer. J. Bot.* 33 (6), 1946 (532–43). [Harvard Univ., Cambridge, Mass.] O.B.D.

[1644]. 12.14.5 : 12.26–8. FOSTER, A. S. **Comparative morphology of the foliar sclereids in the genus *Mouriria* Aubl.** *J. Arnold Arbor.* 27 (3), 1946 (253–71 + plates). [Univ. of California, Berkeley.]

[1645]. 12.14.7 : 12.11.3 : 12.25. BOUREAU, E. L'évolution des faisceaux inversés de la feuille carpellaire du *Cycas circinalis* et ses conséquences anatomiques. **[The evolution of the inverted bundles in the carpellary leaf of *Cycas circinalis* and its anatomical importance.]** *C.R. Acad. Sci., Paris* 222 (11), 1946 (565–6). [F.] D.S.I.R.

[1646]. 12.14.7 : 12.25 : 12.11.21. DOYLE, J. **Developmental lines in pollination mechanisms in the Coniferales.** *Sci. Proc. R. Dublin Soc.* 24 (5), 1945 (43–62). O.R.S.

[1647]. 12.14.7 : 12.25. PURI, G. S. **Some abnormal pollen grains of *Pinus excelsa* Wall.** *Curr. Sci.* 14 (10), 1945 (255–6). [Univ. of Lucknow.]

[1648]. 12.14.7 : 12.26–8. ERDTMAN, G. **Pollen morphology and plant taxonomy. VII. Notes on various families.** *Svensk bot. Tidskr.* 40 (1), 1946 (77–84). [E.] O.B.D.

Deals with the Apocynaceae, Canellaceae, Gonystylaceae, Hamamelidaceae, and Melianthaceae.

[1649]. 12.14.7 : 12.26–8. GUHA, M. P. **On the occurrence of a mixed inflorescence**

in *Artocarpus integrifolia*, **Linn.** *Sci. & Cult.* 11 (2), 1945 (99–100). [Botany Department, Jagannath Intermediate College, Dacca.] L.S.

12.19. Geographical Distribution. Plant Geography and Sociology

See also *For. Abstr.* 8 (No. 1610).

[1650]. 12.19 (54.7) : 09.7. GRIFFITH, A.L. **The vegetation of the Thar desert of Sind.** *Indian For.* 72 (7), 1946 (307–9 + plates). [Forest Research Institute, Dehra Dun.]

The Thar desert is a generally arid region (rainfall 5–10 in.) consisting largely of sand hills and smaller dunes running in the general direction (S.W./N.E.) of the prevailing wind. The vegetation is surprising in its density and variety. Among the commoner tree species are *Acacia senegal*, *Melia azadirachta*, *Cordia rothii*, *Phoenix dactylifera*, *Prosopis spicigera*, and *Tecoma undulata*. Wind erosion is a serious problem, and regulation of grazing is essential. Rats also aggravate erosion. A list is given of the botanical and local names of the commoner trees, small trees, shrubs, herbs and grasses found in the area.

[1651]. 12.19 (67.3) : 3. ANDRADA, E. CAMPOS DE. Breves considerações sôbre o valor florestal de Angola. [**Brief notes on the forest wealth of Angola.**] *Agros, Lisboa* 27 (3/6), 1944 (170–8). [Port.]

Proposals for the work of the Forest Service in developing and managing the forests of Angola with a description of the vegetation in the five main phytogeographical zones.

[1652]. 12.19 (77.5) : 12.26–8. STOUT, A. B. **The Bur Oak openings in southern Wisconsin.** *J. N.Y. bot. Gdn.* 47 (560), 1946 (189–97).

This article has been condensed from a paper published in *Trans. Wis. Acad. Sci.* 36, 1944 (1946) (141–61).

Only a few remnants of the once numerous natural parklands of Bur Oak (*Quercus macrocarpa* Michaux) now survive in Wisconsin. Their disappearance appears to have been brought about largely by the extension of cultivated farmland, increased timber exploitation, and the lack of natural regeneration. The Oaks are of nearly the same age and of good stature, scattered in a park- or orchard-like disposition with a dense sod of grasses between them; there has been for many years no reproduction from seed and no invasion by other woody species. The Bur Oak openings are of particular interest in that they represent a somewhat balanced and static combination of two sharply contrasted types of vegetation.

[1653]. 12.19 (81) : 12.26–8. MACHADO, O. Tinguaciba da restinga (*Fagara arenaria*, Engl.). [**The Tinguaciba of the 'restinga'** (*Fagara arenaria*, **Engl.**)] *Rev. flor., Rio de J.* 4 (1; 2), 1945 (16–20; 8–13). [Port.] [Univ. do Brasil.]

The author discusses some theories on the geological origin of the Brazilian 'restingas', and briefly reviews the general types of vegetation found there. Among the more common plants is *Fagara arenaria* Engl., one of a group of medicinal plants popularly known as Tinguacibas. 10 figures show the approximate geographical distribution of *F. arenaria*, its floral organs and some common vegetational types of the 'restingas'.

12.19.1. *Regional Floras, including Check Lists*

[1654]. 12.19.1 (410). FITCH, W. H., SMITH, W. G., et al. **Illustrations of the British flora: a series of wood engravings, with dissections, of British plants.** L. Reeve & Co., Ltd., Lloyds Bank Buildings, Bank St., Ashford, Kent. 5th (revised) ed., 1944. pp. xxvii + 338.

[1655]. 12.19.1 (51). FANG, WEN-PEI (Editor). **Icones Plantarum Omeiensium.** 2 (2), 1946. pp. 100 + plates. Nos. 151–200 + index. [E.Chin.] [The National Szechuan Univ., Chengtu, Szechuan, China.]

Illustrations and descriptions of 50 species of plants found on Mount Omei in Szechuan Province [cf. *For. Abstr.* 7 (No. 150), 8 (No. 129).] Tree species from the following genera are included: *Ilex*, *Abies*, *Keteleeria*, *Pseudotsuga*, *Tsuga*, *Pinus*, *Cunninghamia*, *Cryptomeria*, *Cupressus*, *Thuja*, *Juniperus*, *Cephalotaxus*, *Taxus*, *Podocarpus*, *Tilia*, and *Bauhinia*. New species described are *Ilex omeiensis*, *I. chieniana*, *I. opienensis* (all Hu Shui-ying), *Tilia omeiensis* Fang.

[1656]. 12.19.1 (729.7). CHEESMAN, E. E., HILL, A. W., and BURTT, B. L. **Flora of Trinidad and Tobago. Vol. II. Part 2. Asterales, Campanales, Ericales, Primulales.** pp. 49–122. Department of Agriculture, Port-of-Spain, Trinidad. 1940. Price 85 c. (3*s.* 6*d.*).

[1657]. 12.19.1 (77.1). MOLDENKE, H. N. **A contribution to our knowledge of the wild and cultivated flora of Ohio.—I.** *Castanea* 9, 1/3, 1944 (1–80).

An annotated list of 1,315 species, varieties, and forms in 699 genera and 236 families.

[1658]. 12.19.1 (931). ALLAN, H. H. **A handbook of the naturalized flora of New Zealand.** *Bull. Dep. sci. industr. Res., N.Z.* No. 83, 1940. pp. 344 + plate.

12.19.2. *Forest Types*

[1659]. 12.19.2 (46) : 12.26–8. MARTIN BOLAÑOS, M. Consideraciones sobre encinares de España. **[Considerations on the Spanish Oak groves.]** [*Publ.*] *Inst. for. Invest. Exp., Madrid* 14 (27), 1943. pp. 106. [Span.]

A general review of the history, economic importance and ecology of the Spanish evergreen Oak forests. Reference is made to the relation between forests and grazing; the regression of the Oak forests due to overgrazing, *Tortrix viridana* attack, fire, and other factors; the present distribution of Oak among other forest types; and the place of *Quercus* spp. in the natural succession. Brief notes are given on individual Oak forests in Spain, and 51 photographs are appended.

[1660]. 12.19.2 (47.4) : 12.25 : 23.1 : 23.24.2 : 23.23.3. ALGVERE, K. V. Om de torra örtrika skogarna i Estland och deras skötsel. **[On the dry forests with abundant herbaceous ground flora in Estonia and their silviculture.]** *Svenska SkogsvFören. Tidskr.* 44 (5), 1946 (396–412). [Sw.e.]

The type described occurs in N. and W. Estonia, occupying about 3–4 per cent. of the total forest area, over Silurian limestone with loose, shallow, fine-textured unpodzolized soil resembling brown earth, rich in nutrients, with good active mor or mor/mull humus, but dry and with a troublesome ground flora of herbs and grasses except in dense stands, where often only moss is present.

The shallowest soil bears Scots Pine, the deeper Norway Spruce, but mixed stands with Pine overwood and Spruce underwood often occur. Birch is found mainly as an admixture. The Pine is broad-crowned and knotty, and windthrow is common where only shallow roots can be formed. The Spruce is often attacked by rot, and pure stands suffer from bark beetles and storm damage. Increment normally depends on soil depth.

Natural regeneration of both Pine and Spruce fails on large open areas and clear fellings. Pine regeneration sometimes succeeds, though erratic in its appearance, in the shelter of old trees. Regeneration of Spruce is sometimes easy to obtain on small open areas and in sheltered positions.

Artificial regeneration of clear fellings is very difficult owing to drought, very heavy weed growth and often frost-heaving: it must be undertaken directly after felling, and preferably some trees should be left to give shade. Completely successful plantations are quite rare. Two special methods are used with a degree of success: (*a*) sowing of Pine on peat turves, where these are available at no great distance; (*b*) a method of oblique planting of 2/0 Pine in which the plant is set at the edge of a hoed planting spot with its roots inserted, plus some earth filling if the soil is very shallow, under the litter layer, leaving the shoot in a more or less horizontal position.

Thinnings, especially of Spruce, require great caution to avoid storm damage.

[1661]. 12.19.2 (66). SCHNELL, R. Remarques sur le peuplement forestier de la région montagneuse du haut Cavally et du massif des Dans (Afrique Occidentale Française). **[Notes on the forest of the mountain region of Upper Cavally and of the Dans Range, A.O.F.]** With translation by Mrs. R. W. J. Keay. *Farm and Forest* 7 (1), 1946 (67–71). [F.E.]

Notes on the two main natural forest types (rain forest and deciduous forest) of the region, and the extensive secondary forest growth which occurs on abandoned farm land. This secondary growth consists largely of the typical species of the deciduous forest which by this means penetrate into the rain forest areas.

[1662]. 12.19.2 (73). BAKER, F. S. **Forest cover types of western North America: report of the Committee on western Forest Types.** Society of American Foresters, Mills Building, Washington 6, D.C. 1945. pp. 35.

A revision of Western terminology, to bring it into line with that already established for the Eastern United States [cf. *For. Abstr.* 2 (125)]. A total of 50 types is described, according to composition, associates, occurrence, place in succession, importance, and variants and synonyms. The tree species mentioned in the type descriptions are listed separately.

[1663]. 12.19.2 (79) : 11.1 : 11.21 : 11.3. KÜCHLER, A. W. **The broadleaf deciduous forests of the Pacific Northwest.** *Ann. Ass. Amer. Geogr.* 36 (2), 1946 (122–47). O.G.

The coastal regions of the Pacific Northwest of the United States have a marine west-coast climate, which in other parts of the world is associated with broadleaved forests of the middle latitudes. In the Pacific Northwest forests, the estimated proportion of broad-leaved trees on a numerical basis is 6 per cent. of the whole forest; the proportion of broad-leaved species to conifers on a basis of timber volume is 1 : 1,000. Compared with the forest vegetation of Southern Chile, New Zealand and France, the present proportion cannot be explained adequately by present climatic or edaphic conditions. The author suggests that the following factors are partly responsible: a fluctuation of climate from conditions similar to modern ones, through a serious deterioration with much glaciation, back to the original climate; the location of the region on the western coast of North America, facing prevailing on-shore winds from the Pacific; the relief features, which by their peculiar character entrapped the deciduous forests at the time of greatest climatic deterioration; the loss of biotypes during the period of entrapment. Further research is necessary in order to determine how far the present biotic environment is responsible.

[1664]. 12.19.2 (945) : 12.26–8. PATTON, R. T. **Ecological studies No. VII. Box-Ironbark association.** *Proc. roy. Soc. Vict.* (*n.s.*) 56, 1944 (35–50). O.R.S.

The Box-Ironbark forests of Victoria consist mainly of Red Ironbark (*Eucalyptus sideroxylon*), White Ironbark (*E. leucoxylon*), and Grey Box (*E. hemiphloia*). The association is of great economic importance since the three species which compose it provide very heavy, durable timbers and occupy stony areas which are unsuitable for any other purpose. The physical environment, composition and structure of the association are described in some detail.

[1665]. 12.19.2 : 12.25 (494) : 23.1. HESS, E. Études sur la répartition du mélèze en Suisse. [**Studies of the distribution of Larch in Switzerland.**] *Beiheft zu den Zeitschriften des Schweizerischen Forstvereins* No. 20, 1942. pp. 80. [F.f.g.]

12.19.4. *Succession*

[1666]. 12.19.4 (945) : 43.3. WILLIS, J. H. **Toorongo sub-alpine flora.** *Vict. Nat.* 61 (10), 1945 (176–80). O.R.S.

In Oct. 1944, the writer examined the Toorongo State Forest Reserve, Victoria, which had been burnt in the great fire of Jan. 1939. Heavy Eucalypt seedling growth and/or Wattles (*Acacia* spp.) formed a dense scrub, 10 ft. or more high, over most of the reserve, but previously burnt-over areas carried little but bracken and *Glyceria dives*. In contrast to the Eucalypts and Wattles, no seedlings of *Nothofagus cunninghamii* were observed, though every butt had a vigorous crop of sucker shoots. A list of vascular plants found on the burnt-over area is given.

12.2. *Special (Systematic) Botany*

12.25. Gymnosperms

[1667]. 12.25. FRANCO, J. DO AMARAL. Sub-géneros e secções do género *Abies* Mill. [**Sub-genera and sections of the genus *Abies* Mill.**] *Bol. Soc. port. Ciênc. nat.* 13 (Supl. 2), 1942 (163–70). [Port.] *Separate* of *Act. Congr. Ciênc. nat., Lisboa*, 1941 (*Liv.* 2).

A new classification of the genus *Abies*.

[1668]. 12.25. FRANCO, J. DO AMARAL. Anotações à sistemática dos géneros *Araucaria* A. L. Juss. e *Sequoia* Endl. [**Notes on the taxonomy of the genera *Araucaria* A. L. Juss. and *Sequoia* Endl.**] *Separate* of *Agros* 25 (6), 1942 (227–34). [Port.]

[1669]. 12.25. FRANCO, J. DO AMARAL. Género *Chamaecyparis* Spach. [**The genus *Chamaecyparis* Spach.**] *Separate* of *Agros* No. 3, 1941 (91–9). [Port.]

A compilation of botanical and general information.

[1670]. 12.25 : 12.14 : 12.11.3 : 12.19. FRANCO, J. DO AMARAL. A *Cupressus lusitanica* Miller: notas acêrca da sua história e sistemática. [***Cupressus lusitanica*: notes on its history and systematy.**] *Agros, Lisboa* 28 (1/2), 1945 (3–87). [Port.f.e.]

Deals with: general references to the genus *Cupressus*; the origin and geographical distribution, systematy and morphological affinities of *C. lusitanica* Miller; a detailed study of the external morphology of *C. lusitanica*, its forms and some related species; generalities regarding variation in the genus *Cupressus*; possibilities of hybridization in *C. lusitanica*, particularly in relation to the flowering season, and suggestions for obtaining pure strains.

[1671]. 12.25 : 12.19 (46). CEBALLOS, L. Notas sobre el *Pinus uncinata* Ram. y su presencia en la Sierra de Gúdar (Teruel). [**Notes on *Pinus uncinata* Ram. and its occurrence in the Sierra de Gúdar (Teruel).**] Escuela Especial de Ingenieros de Montes [Madrid]. 1941. pp. 12. [Span.] *Repr.* from *Las Ciencias, Madrid* 6 (3).

The author separates *Pinus uncinata* Ramond from the complex *Pinus montana* Duroi, which includes also the species *P. pumilio* Haenk. and *P. mughus* Scop. The European distribution of these forms is given in maps and records with more details of the occurrence and ecology of *P. uncinata* in the Sierra de Gúdar. It first appears at altitudes above approximately 1,950 m. in mixture with *P. sylvestris*. It has been used extensively in more northerly latitudes for the fixation of sand dunes but has been little used in afforestation in Spain.

[1672]. 12.25 (469) : 12.11.3. AZEVEDO GOMES, M. DE, and RAPOSO, F. Estudos dendrológicos. I. O género *Pseudotsuga* no Parque da Pena (Sintra). [**Dendrological studies. I. The genus *Pseudotsuga* in the Pena Park (Cintra).**] *An. Inst. Agron., Lisboa* 10, 1939 (121–35 + plates). [Port.]

Three morphologically distinct forms of *Pseudotsuga* occur in the Pena Park. The foliar structure and morphology of individual trees of different ages (20 to 90 years) and provenance are discussed and compared.

12.26-8. Dicotyledons

[1673]. 12.26–8 (73) : 23.27. REHDER, A. **Notes on some cultivated trees and shrubs, IV.** *J. Arnold Arbor.* 27 (3), 1946 (316–8).

[1674]. 12.26–8 (87) : 12.19.1. PITTIER, H. Notas dendrologicas de Venezuela. VI. [**Venezuela: dendrological notes. VI.**] *Bol. Soc. venez. Cienc. nat.* 7 (48), 1941 (133–35). [Span.] I.I.E.

Includes botanical descriptions of some Venezuelan species of *Ficus* (3 new species), *Licania, Inga, Macrolobium* (3 new species), *Machaerium, Drepanocarpus, Coumarouna* and *Lecythis*.

[1675]. 12.26–8 (729.7). SMITH, A. C., and BEARD, J. S. **The genus *Eschweilera* in Trinidad and Tobago.** *J. Arnold Arbor.* 27 (3), 1946 (305–13).

Notes on the ecology and taxonomy of 4 species of *Eschweilera* found in Trinidad and Tobago. Two new species, *E. trinitensis* and *E. sandwithiana*, are described.

[1676]. 12.26–8 (86). SCHULTES, R. E. Estudio preliminar del genero *Hevea* en Colombia. [**Preliminary study of the genus *Hevea* in Colombia.**] *Rev. Acad. Col. Cienc., Bogotá* 6 (22/23), 1945 (331–8). [Span.] *Abstr.* in *Trop. Woods* No. 86, 1946 (36).

[1677]. 12.26–8 (86). SCHULTES, R. E. **The genus *Hevea* in Colombia.** *Bot. Mus. Leafl. Harv.* 12 (1), 1945 (1–19 + plates). K.

[1678]. 12.26–8 : 23.52. MELO, O SILVEIRA. A identificação dos angicos. [**The identification of the Angicos.**] *Rev. flor., Rio de J.* 4 (2), 1945 (14–7). [Port.]

Tree height, wood colour, and characteristic features of bark, leaves, inflorescence, and fruit are among the features used in identifying species of *Piptadenia* used as shade trees in coffee plantations.

[1679]. 12.26–8. STANDLEY, P. C. **Brazilian Tulipwood.** *Trop. Woods* No. 86, 1946 (1–3).

Brazilian Tulipwood is *Dalbergia variabilis* var. *tomentosa* (Vogel) Benth. as treated in the *Flora Brasiliensis*, or, more correctly, *D. frutescens* var. *tomentosa* (Vogel) comb. nov. It appears to assume either vine or tree form according to the habitat.

[1680]. 12.26–8. BARRETT, M. F. **The case of the vanishing *Ficus racemosa*.** *Bull. Torrey bot. Cl.* 73 (3), 1946 (312–25). O.B.D.

Evidence suggests that *Ficus glomerata* Roxb. and *F. racemosa* L. are synonymous. The author gives probable reasons for the disappearance of the name *F. racemosa* from botanical literature.

[1681]. 12.26–8 (86). DUGAND, A. Nuevas nociones sobre el genero *Ficus* en Colombia, V. **[New ideas on the genus *Ficus* in Colombia. V.]** *Caldasia* 4 (17), 1946 (113–20). [Span.] I.A.B.

Includes 3 new species and 1 new variety.

[1682]. 12.26–8. SCHULTES, R. E. **Plantae colombianae II.** *Bot. Mus. Leafl. Harv.* 10 (10), 1942 (301–24). K.

Description, chemistry, and uses of *Paullinia yoco* Schultes and Killip, sp. nov., an important economic climbing liana, long employed as a stimulant by the Indians of a small part of southern Colombia and the adjacent regions of Ecuador and Peru.

[1683]. 12.26–8 (6). BRENAN, J. P. M. **Notes on *Hirtella* in East Tropical Africa.** *Trop. Woods* No. 86, 1946 (3–11). [Imperial Forestry Institute, Oxford Univ.]

A redescription of *H. zanzibarica* Oliv. A new variety of *H. sapini*, *greenwayi* var. nov., from East Africa, is described.

[1684]. 12.26–8. RAIZADA, M. B. ***Tractocopevodia*—a new genus of Rutaceae.** *Indian For.* 72 (6), 1946 (275–7 + plate). [Forest Research Institute, Dehra Dun.]

Tractocopevodia gen. nov. and *burmanica* sp. nov. Raizada et Narayanaswami, Myitkyina, 6,200 ft., Burma. The hybrid name indicates affinities with *Tetractomia*, *Melicope*, and *Evodia*.

13. FOREST ZOOLOGY

13.1. *General Zoology*

[1685]. 13.15 (66.68). PAULIAN, R. La voûte de la forêt tropicale, milieu biologique. **[The canopy of tropical forest as a biological environment.]** *Rev. sci., Paris* 83 (Fasc. 5, No. 3245/51), 1945 (281–6). [F.] D.S.I.R.

Cf. *For. Abstr.* 8 (No. 977).

[1686]. 13.15 : 13.2. LEASK, M. F. **Association of two types of sawfly larvae in single colonies.** *Vict. Nat.* 60 (12), 1944 (191–3). O.R.S.

Larvae of two genera, *Perga dorsalis* and *Pergagrapta* sp., were found living in close association on *Eucalyptus rostrata* and *E. sideroxylon*, the small pink larvae of *Pergagrapta* being found concealed inside bunches of the large black larvae of *P. dorsalis*. The exact nature of and reason for this association remains obscure.

[1687]. 13.15 : 45.12 : 91.1 (492). VOÛTE, A. D. Een en ander over de veranderingen in de populatiedichtheid van de zoogdieren in het Nationale Park De Hooge Veluwe gedurende en na het oorlog. **[Notes on changes in population densities of mammals in the De Hooge Veluwe National Park during and after the war.]** *Nederl. Boschb.-Tijdschr.* 18 (10), 1946 (217–26). [Du.] [Biologisch Laboratorium 'Hoenderloo'.]

Decreases are noted in populations of red deer, moufflon, hare (except where rabbits were formerly abundant), rabbits (to $\frac{1}{5}$ and $\frac{1}{10}$ of the original population), red squirrels (exterminated), hedgehogs, stoats, polecats and weasels. Roe-deer and moles remained constant. Increases took place in foxes and wild boar, and three pine-martens appeared.

The changes are due to the fact that the Dutch were not allowed to hunt, while Germans and later Canadians hunted red deer and moufflon. Foxes, previously systematically killed, multiplied without hindrance, reducing hare and rabbit populations and practically exterminating pheasant and curlews. Pine-martens and goshawks exterminated the squirrels. The changes indicate the possibility of keeping down rabbits with the aid of their natural enemies.

13.2. *Special (Systematic) Zoology*

[1688]. 13.2 (67.5). PAULIAN, R. Les Acanthoceridae (Col. Scarabaeoidea) du Congo et de l'Afrique occidentale tropicale. **[The Acanthoceridae (Col. Scarabaeoidea) of**

the Congo and tropical West Africa.] *Rev. Zool. Bot. afr.* 39 (2/3), 1946 (197–202). [F.]

African species of *Pterorthochaetes* and *Philharmostes* form two biological groups, one consisting of saproxylophagous species living under decayed bark or in the pockets of humus in cavities of trees to a height of 10 m. above the ground, the other of mycophagous species living on the leaves of herbaceous plants, especially Rubiaceae, in light undergrowth. The morphology and distribution of the various species are described.

[1689]. 13.2 : 01.6 : 31.43 : 45.3. TOWNSEND, L. H. [Compiler]. **Literature of the Black Carpenter Ant, *Camponotus herculeanus pennsylvanicus* (Degeer.): a bibliography with abstracts.** *Circ. Ky. agric. Exp. Sta.* No. 59, 1945. pp. 27.

2. SILVICULTURE

[1690]. 2 (410) : 4 : 07.7 : 84 : 95.1 : 94.3. **Forestry practice: a summary of methods of establishing forest nurseries and plantations with advice on other forestry questions for owners, agents and foresters.** *Bull. For. Comm., Lond.* No. 14, 1946. pp. 91.

The last revision of this Bulletin was made in 1939, and a full revision is now once more needed. In the meantime, the present issue is a partial revision. The tabular 'Notes on Individual Species' have been entirely revised, as have Tables I and II on nursery treatment for each species. The section on 'Thinning' has been re-written, and the list of suppliers of tools and equipment brought up to date. An official explanatory note on the dedication scheme is included.

[1691]. 2 (67.5) : 3 : 7. HUMBLET, P. Aménagement des forêts climatiques tropicales au Mayumbe. [**Management of tropical forest in Mayumbe.**] *Bull. agric. Congo belge* 37 (1), 1946 (15–87). [F.]

The region of Mayumbe produced, in 1939, more than 80 per cent. of the total wood exports of the Belgian Congo, chiefly from its pure dense stands of Limba (*Terminalia superba*). Other valuable species are *Chlorophora excelsa, Entandrophragma utile, E. angolense, Sarcocephalus diderrichii*, and *Gossweilerodendron balsamiferum*. It is estimated that, at the present rate of exploitation, the stands of Limba will be exhausted in 50 years' time. A study of natural regeneration in Mayumbe showed that none of the dominant, tropical species, notably *Terminalia superba* and *Chlorophora excelsa*, was represented in the regeneration which established itself under the herbaceous stratum of vegetation. These species produce seed abundantly, but the seedlings are unable to establish themselves except on spots where the mineral soil is exposed and remains exposed long enough to give the young plants a sufficient lead over the undergrowth. It is therefore useless to leave seed-trees in the hope of regenerating the exploited species, unless some silvicultural care is given. The present stands of Limba probably owe their origin to native, shifting cultivation, which provides suitable conditions for its regeneration. The system of treatment recommended consists in clearing parallel strips in the forest, amounting to 10–20 per cent. of the total area, leaving the existing forest intact between the strips. The strips should be cleared to varying densities of cover, according to the species to be regenerated. Notes are given on the silvicultural characters and requirements of the various species mentioned above. Planting is preferable to sowing. Basket-planting is recommended for *Sarcocephalus diderrichii*, which grows very slowly, and stump-planting for the other species. Detailed notes are given on the preparation of strips, collection of seed, nursery technique, transplanting, and tending. Estimated costs are given for the planting in this way of one hectare of forest.

[1692]. 2 : 02.1 : 32.29.2. HAWLEY, R. C. **The practice of silviculture.** John Wiley & Sons, Inc., New York. Chapman & Hall, Ltd., London. 5th ed., 1946. pp. 354. Price $4.00.

The first edition of this book was published in 1921 and the fourth in 1937. It is written

as a school textbook in silvicultural practice and does not deal with silvics, i.e. the fundamental laws underlying the growth of the tree and the forest. It covers the art of producing forest crops but does not go into detail for each of the 100 or more important tree species of the U.S.A., except for the purpose of illustrating principles and procedures by specific examples.

Although silvicultural practice in the U.S. is still in the developmental stage it can be introduced with a varying degree of refinement even under discouraging economic conditions. Production in managed and unmanaged forests, and the cost of silviculture in relation to utilization are therefore discussed at the outset.

After a general account of the treatment of the stand during the regeneration period, the following methods are described in detail: clear cutting (with artificial and natural reproduction), seed-tree, shelterwood, selection, coppice and coppice with standards. Thinnings and cuttings are grouped mainly according to purpose and methods of control; the need for, purpose and cost of pruning are discussed at length; the importance of slash disposal is reflected in the 25 pages devoted to it.

After each of the main subjects, a list of references to literature is given. The book is illustrated with diagrammatic line drawings and graphs and there are no photographs.

[1693]. 2 : 12.26–8 (496) : 56 : 57 : 09.7. Vural, F. Belgrad Ormaninda meşenin silvikültürce tabi olacağı muamele, ekolojik esaslar ve teknik teklifer. **[Principles and technique in the silvicultural treatment of Oaks in the Turkish instructional Forest of Belgrad.]** *Çalismalar. Yüksek Ziraat Enst., Ankara* No. 125, 1940. pp. 144 + 92. [Turk. turk.G.g.]

A monograph, with chapters on: (i) The Belgrad Forest (near Constantinople) as an Oak site, including a general account of the forest and its history, the Oak species represented (*Q. frainetto* and *hartwissiana* the most important; *Q. pedunculiflora, cerris, polycarpa* and *dalechampii* also present) and their distribution, and notes on climate and soil [cf. *For. Abstr.* 8 (No. 1594)]. (ii) The growth and tending of the Oaks, with sections on present form, increment and stocking of the old stands, and on the growth and tending of young ones. (iii) Regeneration, with sections on ecological conditions, regeneration following various types of felling, and a statement of the principles for Oak regeneration in this forest from the points of view of silviculture and management.

[1694]. 2 : 12.16–8. Lopes, L. Simões. Instruções para a cultura dos eucaliptos. **[Instructions for the cultivation of Eucalypts.]** Serviço de Informação Agrícola, Ministério da Agricultura, Rio de Janeiro, Brasil. *S.I.A.* 812, 1944. pp. 33. [Port.] [Cf. *For. Abstr.* 8 (Nos. 1702–3, 1707).]

21. SILVICULTURAL CHARACTERS OF TREE SPECIES

[1695]. 21 : 12.26–8 (82) : 12.19 : 31.0. Alfonso, J. L. Apuntes sobre la lenga. **[Notes on *Nothofagus pumilio* in Argentina.]** *Mundo maderero* 6 (73), 1946 (13–4). [Span.]

[1696]. 21 : 12.26–8 : 23.3. Guinier, P. Les peupliers et leur culture. **[Poplars and their cultivation.]** *Rev. Eaux For.* 84 (8/9), 1946 (566–94). [F.]

The groups dealt with are the White, Black and Balsam Poplars. A brief account is given of the principal species and their silvicultural characters. [Cf. *For. Abstr.* 8 (Nos. 1640, 1704).]

21.0. *Adaptability to the General Environment. Acclimatization*

[1697]. 21.0 (44). Rol, R. Du choix des essences en matière de reboisement. **[The choice of species in relation to reafforestation.]** *Rev. Eaux For.* 84 (8/9), 1946 (536–53). [F.]

A general review of the subject, with consideration of the principal economic, biological, and ecological factors to be taken into account. The most pressing problem in France is to find quick-growing species which can be introduced into degraded forests in order to produce, as soon as possible, the softwoods of which the country is in such need.

[1698]. 21.0 (469) : 12.25. Franco, J. do Amaral. Contribuïcão para o estudo das Podocarpáceas cultivadas em Portugal. **[Contribution to the study of the Podocarpaceae cultivated in Portugal.]** *Agros, Lisboa*

27 (3/6) 1944 (184–9), 28 (3/4), 1945 (123–49). [Port.]

Part 1 includes a brief discussion on the systematy of the family, a key showing the fundamental group characters, and notes on the natural distribution of the genera. Part 2 describes the habit, dimensions, vegetative and reproductive organs, geographical distribution and vernacular names of species of *Dacrydium*, *Podocarpus* and *Phyllocladus* grown in Portugal.

[1699]. 21.0 (54.87) : 12.26–8 : 23.24. PARSONS, T. H. **Further notes on Balsa experiments at the Royal Botanic Gardens, Peradeniya: trials and errors.** *Trop. Agriculturist, Ceylon* 100 (4), 1944 (243–7). [Royal Botanic Gardens, Peradeniya.]

Growth records of Balsa in experimental plots in the Royal Botanic Gardens, Peradeniya, confirmed the view expressed earlier [cf. *For. Abstr.* 6 (161)] that Balsa will grow successfully in Ceylon even in soils of poor humus content and with little attention after the initial stages. A planting distance of 12 × 15 ft. gave considerably better results than one of 10 × 10 ft., producing at 2 years of age an average girth per tree of 2 ft. at 3 ft. from the ground compared with the same average girth at 3 years of age for the closer spacing. A trial planting of 15 × 15 ft. has also been made.

Balsa grown in plantations under favourable conditions in good light soil showed an average girth of over 3 ft. at 3 ft. above ground at 3 years of age.

[1700]. 21.0 (68.7) : 23.3. VILLIERS, P. C. DE. Kommersiele bosbou in die Middellande. **[Commercial forestry in the Midlands [Cape of Good Hope].]** *J. S. Afr. For. Ass.* No. 13, 1946 (12–8). [Afrik.]

Notes on plantations in the Knysna area of the south-eastern coastal strip of Cape Province. The species principally used are *Pinus radiata*, *P. caribaea* and *P. pinaster*. *Eucalyptus diversicolor*, *E. gomphocephala*, *Acacia melanoxylon* and *Populus canescens* var. *rossii* have also been planted with success. Notes are given on choice of species for different soil types, preparation of ground, and costs.

[1701]. 21.0 (68.9) : 12.25. NYASALAND. **Annual report of the Forestry Department for the year ended 31st December, 1945.** Govt. Printer, Zomba. 1946. pp. 16.

Trials of selected species of Pines in varying climatic and soil conditions have been in progress in Nyasaland for nearly 20 years. It is now evident that a few species are likely to be of great value for afforestation in the moister regions of the Protectorate. *Pinus longifolia*, which is doing uniformly well, considerably increases its rate of growth after the first 6 or 7 years: losses are sometimes caused by moles attacking the roots. *P. caribaea* continues to show good growth and form on moist sites but is sometimes poor on well drained hill slopes. *P. patula* seems to do best on sandy, well drained soils; it will not tolerate lateritic soils. *P. taeda* shows a good form although somewhat slow of growth; because of its heavier shade it tends to suppress grass sooner than some of the other species of Pines. *P. radiata* shows quick growth and hardiness, but is subject to fungal attack. *P. khasya*, although of very rapid growth, is rather variable in form; it has shown remarkable recovery after a severe fire (p. 4).

[1702]. 21.0 (81) : 12.26–8 : 23.3. : 22.83. Plantar matas mistas de Eucalipto. **[Planting of Eucalypts in mixture.]** *Brasil madeireiro* 2 (11), 1946 (41). [Port.]

In Brazil, *Eucalyptus* has been planted pure and the disadvantages of extensive pure crops are now evident. The author advocates mixture with other exotic or indigenous species and lists the advantages.

[1703]. 21.0 (81) : 12.26–8 : 31.0. OLIVEIRA, A. PEIXÔTO DE. Plantio racional de essências florestais. **[Rational planting of forest tree species.]** *Bol. Sec. Agric. Ind. Com., Pernambuco* 12 (4), 1945 (330–41). [Port.]

Deals with *Eucalyptus* spp. in the State of São Paulo, covering choice of species, artificial regeneration, nursery technique and planting out. [Cf. preceding abstract and Nos. 1694, 1707.]

[1704]. 21.0 (81) : 12.26–8 : 21.0. TEIXEIRA, E. F. Aumenta o interesse pelo cultivo do álamo. **[Increased interest in the cultivation of Poplar.]** *Brasil madeireiro* 2 (14), 1946 (9–10). [Port.]

Poplar is now one of the most widely planted and useful trees in São Paulo and the southern states of Brazil. Data are given on the growth in Brazil of three introduced Poplars: the hybrids A.M. and A. No. 7, and the variety

laurifolia. The hybrid A.M. (*Populus nigra* 'var. *stela*' × *P. canadensis*) shows particular industrial promise, owing to its rapid growth and resistance to disease. [Cf. *For. Abstr.* 8 (Nos. 1640, 1696).]

[1705]. 21.0 (82) : 12.25 : 23.2. CARMELICH, J. N. F. Instrucciones para el cultivo de pinos. **[Instructions for the cultivation of Pines.]** *Alm. Minist. Agric. Argent.* 20, 1945 (281–6). [Span.] I.I.E.

[1706]. 21.0 (82) : 12.26–8 : 23.2. SUAREZ CAVIGLIA, O. R. El cultivo del castaño en la República Argentina. Su importancia y posibilidades. **[The cultivation of Chestnut in the Argentine Republic. Its importance and possibilities.]** *Alm. Minist. Agric. Argent.* 20, 1945 (151–3). [Span.] I.I.E.

[1707]. 21.0 (82) : 12.26–8 : 23.2. CARMELICH, J. N. F. Instrucciones para el cultivo del eucalypto. **[Instructions for the cultivation of Eucalypts.]** *Alm. Minist. Agric. Argent.* 20, 1945 (171–3). [Span.] I.I.E.

[1708]. 21.0 (83) : 23.24 : 5 : 7 : 95. GILMOUR, J. D. **A Chilean forest plantation.** *For. Chron.* 22 (3), 1946 (190–3).

An account of a Chilean plantation area, covering some 50,000 acres, mainly of *Pinus radiata* and *Eucalyptus globulus*. Plantations are not taxed for the first 35 years and there is no yield or similar tax. Profits are taxable like any other income. *P. radiata* usually averages 310 bd. ft. per tree and 200 trees to the acre when logged, mostly good clear lumber. Thinnings are used as mine timber. Plantation-grown lumber of this kind will soon provide severe competition to Canadian lumber in what have hitherto been its best markets.

[1709]. 21.0 (931) : 12.25. YARHAM, E. R. **Exotics in New Zealand.** *Wood* 11 (8), 1946 (216–8).

The New Zealand State forests of exotics occupy just under 450,000 acres; 370,000 acres are held by over 30 companies planting exotics. The annual cut of rough-sawn exotic Pine timber alone in 1941–42 was 56,247,000 bd. ft. The species planted in North Island in recent years have been *Pseudotsuga taxifolia*, Western Yellow Pine (*Pinus ponderosa*), *Pinus radiata*, and Corsican Pine (*P. nigra* var. *calabrica*). The Southern Pines (*Pinus palustris*, *P. taeda* and *P. caribaea*) have shown promising results in the Auckland Conservancy. In South Island Western Yellow Pine, Corsican Pine, *Pseudotsuga taxifolia* and *Pinus radiata* are used. The last-named species has proved the most highly productive of the introduced Pines.

[1710]. 21.0 : 12.25. PERRIN. Le pin maritime à travers le monde. **[The Maritime Pine (*Pinus pinaster* Sol.) throughout the world.]** *C. R. Acad. Agric. France* No. 9, 1943 (254–7). [F.] I.I.E.

Reference is made to the extensive use of *Pinus pinaster* outside its natural range, as a commercial crop. Sections are included on the history of the species in Africa, Australia, and South America.

21.1. *Light and Temperature Requirements*

[1711]. 21.12 : 12.25 : 12.19. BOUDRU. Quels sont les facteurs qui limitent l'extension de l'Épicéa? **[What are the limiting factors for the extension of Spruce?]** *Bull. Soc. for. Belg.* 52 (7/8), 1945 (76–83). [F.]

After reviewing some of the literature on the subject, the author concludes that the natural area in Europe of Spruce growing *in mixture*, extends further west and to lower altitudes than would be indicated by the isotherm of – 1° C. during the coldest month, which has been suggested as a limiting line. A more accurate, though still more or less arbitrary, figure would be – 0·5° C. average temperature in the month of January (e.g. Lüneburg Heath in N.W. Germany and the foot of the Alps in Northern Italy). [Cf. *For. Abstr.* 8 (Nos. 1723–5).]

21.3 *Soil Requirements.*

[1712]. 21.32 : 12.26–8 : 11.49.2 (57.6). KRUPENIKOV, I. A. **Ecological and biochemical characters of *Betula kirghizorum* Saw.-Ryczg. resulting from the plant's adaptation to soils impregnated with salts.** *C.R. (Doklady) Acad. Sci. URSS* 47 (1), 1945 (64–6). [E.] [National Park of Naurzum, Kazakhstan.] L.S.

21.6. *Behaviour in the Stand*

[1713]. 21.6 : 07.7. KEEN, F. P. **A tree-class slide rule.** *J. For.* 44 (10), 1946 (755–7).

As a supplement to the description of Keen's tree classification [cf. *For. Abstr.* 5 (108)], an alignment chart integrating the most important factors has been converted into slide rule form for convenient field use, particularly in checking borderline cases. It is primarily applicable to the interior Ponderosa Pine type, site IV, of Eastern Oregon.

[1714]. 21.61 : 11.12 : 01.7. OPATOWSKI, I. **On oblique growth of trees under the action of winds.** *Bull. math. Biophys.* 8 (2), 1946 (41–9). [Univ. of Chicago.] L.S.

It is shown that an inclined regular growth of tree trunks under the action of prevailing winds may be explained as a response of the plant to the mechanical action of the wind, in conformity with the Schwendener theory of shape of plants based on the concept of maximum strength. A possible mechanism of such response is suggested. The condition of maximum strength determines the inclination of the tree trunk on the basis of purely mechanical considerations. A numerical example computed for a palm agrees with observational data. *Author's summary.*

22. SILVICULTURAL SYSTEMS. FORMS OF STAND

22.1. *High Forest Forms*

[1715]. 22.11 (74.7) : 22.88.2. COPE, J. A. **Acid wood cuttings in Delaware County, New York.** *J. For.* 44 (8), 1946 (596–7).

A note on the excellent even-aged stands of hardwoods consequent on clear-cutting in Delaware County, New York. The writer recently inspected 1,000 acres of such stands ranging in age from 15 to 40 years. Sugar Maple is the dominant species in most of these stands but there are also some pure stands of White Ash with 200 to the acre which have been growing at a rate of 1 in. in diameter in 4 years for the last decade and show no signs of slowing up.

[1716]. 22.13 : 57 : 23.1 (494). BADOUX, E. Le résultat de trente ans de coupes progressives au Malvaux de la ville de Bienne (Liesisbrunnen). **[The result of 30 years of Swiss *Femelschlag* fellings in the Malvaux forests of the town of Bienne (Liesisbrunnen).]** *Schweiz. Z. Forstw.* 97 (11), 1946 (489–96). [F.g.] [Institut fédéral de recherches forestières.]

In 1915 two plots were laid out near the lower limit of the Jura Beech forest in a stand derived from gappy natural regeneration of Silver Fir beaten up with planted groups of Spruce and formerly treated by regular crown thinnings. There was no essential difference in the initial stocking of the plots. Since 1915, operations have recurred at 5-year intervals, consisting in (*a*) grade B–C low thinnings in one plot (control), and (*b*) Swiss *Femelschlag* (refined group) fellings designed to secure and extend regeneration in groups, with selective thinnings and fellings for light increment on the older trees, in the other.

Results so far are clearly in favour of (*b*), where it has been possible to obtain and control regeneration without current increment falling below that of (*a*). Growing stock is now 720 cu.m. (45 sq.m. basal area) per ha. in spite of the removal of 597 cu.m. (44 sq.m. basal area), while the control contains 1,018 cu.m. (66·8 sq.m. basal area) per ha. and 232 cu.m. (18 sq.m.) have been removed. Mean annual increment has been 21·0 cu.m. per ha. for (*b*) and 19·6 for (*a*). Increment has been concentrated in (*b*) on to half the number of stems and the volume of the mean stem is half as much again as in (*a*). Current basal-area increment of Silver Fir has been much better than that of Spruce; in addition, the latter suffers from butt rot in middle age. Selective thinning in (*b*) has rid the plot of all very defective dominant and codominant trees and brought down those poorly formed but capable of yielding timber to 7 per cent. (21 in the control), while 43 per cent. of the stand (30 in the control) is in first-grade stems.

Stand (*b*) now has a large number of regeneration groups in various stages of development, and the gradual progress of regeneration facilitates manipulation. Advance growth of Beech covers the ground before any considerable opening of the overwood has been made. Gradual extension of the groups also prevents hardwoods from taking over completely: both Silver Fir and Spruce regeneration come in and are encouraged, where necessary, by removing or topping the competing hardwoods. Tending operations in the young growth are

frequent and the forest is being slowly converted to storeyed structure and group mixtures which should give the desired basis for selective treatment.

[1717]. 22.14.1 (494) : 6 : 76. AMMON, W. Das Plenterprinzip in der schweizerischen Forstwirtschaft. **[The selection principle in Swiss forestry.]** Verlag Paul Haupt, Bern. (2nd, revised ed.) 1944. pp. 150. [G.]

The second edition of this book by one of the leading exponents of the selection system is some 40 pages longer than the first edition of 1937; the general plan, however, remains the same and the expansion has been fairly evenly distributed between the various chapters in order to give as clear and accurate a picture as possible of the subject.

The main chapters are: I. (15 pp.). The renaissance of the concept of selection forestry. II. (pp. 27) The selection principle as a concept and its sphere of application (here a brief comparison of *Plenterwald* and *Dauerwald* has been added). III. (pp. 25) The structure and development of the selection forest. IV. (pp. 21) Management (silviculture and organization). V. (pp. 40) Financial yields from the selection forest.

There are 25 handsome photographs.

[1718]. 22.14.2 : 12.26–8 : 56.05. SCHOLZ, H. F. **Cutting immature Oak timber sacrifices quality increment.** *Tech. Note Lake States For. Exp. Sta.* No. 253, 1946. pp. [1].

Results of an analysis of 150 Red Oak trees in two stands in Wisconsin confirm that timber should be held until mature if quality increment is not to be sacrificed. In an 80-year-old stand the volume of No. 1 logs increased during the last 30 years from 18 to 53 per cent. of the total, and in a 100-year-old stand from 9 to 44 per cent.

23. FORMATION OF STANDS

Cf. also *For. Abstr.* 8 (No. 1660).

[1719]. 23 (492) : 21.0. BRANTSMA, W. Herbebossching van loofhoutopstanden in een Veluwsch boschbedrijf. **[Regeneration of hardwood stands in a forest in Veluwe.]** *Ned. Boschb.-Tijdschr.* 13 (5), 1940 (245–9). [Du.]

The failure of natural regeneration of old open stands, chiefly of Beech, in this region, can be overcome by clearing and burning shrubs, cultivating and liming the acid humus soil. Frost, drought and weed growth are the chief adverse factors, so that the main difficulty remaining is to judge when shelterwood may be safely removed. In the author's opinion, natural regeneration is worth while only on the moister sites with soils of fine texture, where hardwoods will do well. Sessile Oak should be admixed in groups and soil improvers such as Hornbeam, *Prunus*, and Spanish Chestnut added.

Beech on unsuitable sites can be clear felled and the sites sown, after cultivation and liming, with Douglas Fir, Larch and Red Oak. Sitka Spruce has been used to some extent, *Prunus* and Oak as soil improvers, and Rowan comes in naturally. The chief species, Larch, Douglas, and Red Oak, are sown either in strips (those for conifers twice the breadth of those for Red Oak) or in groups. So far, the young stands appear promising as regards growth and effect on the soil. Scots Pine, tried formerly in this area, gave good growth but is of no use for soil improvement.

[1720]. 23 : 12.26–8 (54.7). DHARESHWAR, S. S. **Occurrence of *Hopea parviflora* in Honavar Range, Western Division, Kanara, Bombay Province. II.** *Indian For.* 72 (7), 1946 (310–5).

Experiments on the regeneration of *Hopea parviflora*: (1) the establishment of natural regeneration by a shelterwood system; (2) interplanting in Teak plantations; (3) planting under 2-year-old coppice; and (4) transplanting in bare lateritic soil. All except the second experiment showed satisfactory results. The writer gives an outline of methods of treatment recommended for promoting natural and artificial regeneration of the species. [Cf. *For. Abstr.* 7 (No. 668).]

23.1. *Natural Regeneration*

[1721]. 23.1 : 12.19 : 12.11.21 : 13.15 (68.3). GERSTNER, J. **Some factors affecting the perpetuation of our indigenous silva.** *J. S. Afr. For. Ass.* No. 13, 1946 (4–11).

Among the factors discussed are the presence or absence of animal agents of fertilization and germination. Many seeds have to pass through

the alimentary canal of an animal in order to germinate easily. A number of species, including *Encephalartos altensteinii, Rawsonia lucida, Landolphia kirkii, Salacia gerrardii, Garcinia gerrardii, Xylotheca kraussiana, Gardenia jovistonantis, G. thunbergiana, G. rothmannia, Oxyanthus* spp., *Fagara capensis*, are distributed solely by monkeys. The rare Livingstone antelope eats the pods of the very poisonous tree *Erythrophloeum guineense* and is probably responsible for its propagation. The extermination of such a species of animal will in time also destroy the corresponding tree species.

Enemies to trees are the native herbalists who sell 100–200 different kinds of barks and roots of valuable and often rare woody plants. Each of the 9 million or more male natives of the Union possesses from 2 to 6 tough fighting sticks and knobkerries, all cut from saplings of the highest quality timbers.

The escape of introduced foreign species is a menace to the indigenous virgin forests. The most injurious are *Acacia longifolia, Litsaea sebifera* and *Millettia sutherlandi*, which are becoming dominant in some parts.

[1722]. 23.1 : 12.25. SILVERSIDES, C. R. **Some observations on Spruce and Balsam regeneration: Black Sturgeon Concession, the Great Lakes Paper Company, Ltd.** *Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 816 (F–2), 1945. pp. 5.

[1723]. 23.1 : 12.25. LACHAUSSÉE, E. La régéneration naturelle de l'épicéa. [**Natural regeneration of Spruce.**] *Bull. Soc. for. Franche-Comté* 24 (1), 1943 (22–9 + plates). [F.]

A discussion of the problems of natural regeneration of Spruce and the succession of Spruce and Fir in the Alps. [Cf. *For. Abstr.* 8 (No. 1711).]

[1724]. 23.1 : 12.25 : 12.19.4. FRANÇOIS, T. A propos d'un phénomène d'alternance. [**A phenomenon of succession.**] *Bull. Soc. or. Franche-Comté* 23 (14), 1942 (853–60). [F.]

A discussion of the problems connected with natural regeneration of Spruce in the Alps. The writer holds that, in a natural state, Fir would succeed Spruce, and that the apparent reverse succession in this region is due to human interference (e.g. clear felling of Fir stands) and meteorological accidents (often caused in the first place by human interference).

[1725]. 23.1 : 12.25 : 11.42.2 : 11.44 : 21.3. LINDQUIST, B. Några experiment till belysande av den sydskandinaviska kulturgranskogens reproduktionsförhållanden. [**Some experiments towards the elucidation of conditions for regeneration in the Norway Spruce plantations of south Scandinavia.**] *Svenska SkogsvFören. Tidskr.* 44 (4), 1946 (279–96). [Sw.]

(i) *Field experiments*: Sound Norway Spruce seed was sown in April on (*a*) two plots on weakly nitrifying mull soil and (*b*) two plots on strongly nitrifying mull soil at Kongelund in Skåne. Ground vegetation had previously been removed, stand conditions were uniform, and light conditions uniform and very favourable. Examination at the end of November showed that seedlings had developed worse on the strongly nitrifying mull in spite of the removal of competition from ground vegetation. About 20 per cent. of the seed had germinated on the weakly nitrifying soil, but only 10 per cent. on the strongly nitrifying one. In addition, not less than 45 per cent. of the germinated seedlings on the strongly nitrifying mull were dead or dying at the end of the experiment, and the remainder showed an evident tendency towards poorer development of short roots, long roots, mycorrhiza and needles, in many cases resembling plants obtained in earlier investigations from blanks in regeneration on mulls in Skåne and Denmark.

(ii) *Laboratory pot trials*: The soils used were a weakly nitrifying mor and a strongly nitrifying mull. In each pot 10 freshly germinated Spruce seeds were sown and series were established, under otherwise uniform conditions, to assess the effect of litter cover on nitrification and seedling development in the mull, and to compare development on the mull and the mor with and without *Oxalis* as cover. Results show that: (*a*) If a strongly nitrifying mull stands for a longish period in pots without a covering of litter, a considerable decrease in nitrification capacity, or even the cessation of nitrification, may be expected. (*b*) Where nitrification was largely maintained by the presence of litter, plant development was very poor, whereas excellent plants developed on the bare mull, where nitrification capacity decreased more decidedly. (*c*) Plants in litter-covered mull with *Oxalis* cover developed a little more poorly than those on mull with

litter alone, but the difference was not considerable and mortality was the same. On the mor, *Oxalis* + litter gave rather poorer development than litter alone, but vigour was generally good. Mortality was high on the mull, almost nil on the mor, and the number of needles and short roots was considerably higher for the latter. Competition from *Oxalis* thus had little effect compared with soil conditions.

The results support Lindquist's previous conclusion that on the south Scandinavian mulls the failure of Spruce regeneration is due to soil factors rather than to light conditions or competition from the ground flora.

[1726]. 23.1 : 12.25 : 12.11.21 : 22.12. COOMBS, W. F. **Certain aspects of Chir (*Pinus longifolia*) regeneration.** *Indian For.* 72 (6), 1946 (286–8).

The writer challenges the theory of the periodical occurrence of seed years of Chir (*Pinus longifolia*) and the belief that seeding fellings are mainly of value in admitting light to the seedlings. Observations have shown that profuse seeding is frequently the reaction of the tree to natural stimuli which threaten to destroy it, and the writer believes that 'in a well grown forest it is a firm principle that the greater the stimulus the greater the seeding results'. He advocates the adoption of this principle in silviculture.

23.2. *Artificial Regeneration*

[1727]. 23.2 (47.0) : 07.7 : 11.47.1 : 32.29. GUMAN, V. V. Mekhanizatsiya i ratsionalizatsiya lesokul'turnÿkh rabot. **[Mechanization and rationalization of artificial regeneration work.]** *Trud. vsesoyuz. nauchno-issledov. Inst. lesnogo Khoz.* No. 12, 1940 (5–115). [Russ.]

This paper is largely a review of Russian and other literature.

Part I deals with the production of planting stock, under the headings:—(i) *Seed husbandry* (organization, collection, extraction and cleaning, viability tests, and storage), including a brief account of an experiment on induced seed production in 25-year-old Pine, in which ringing of branches or stems gave better results (72 per cent. of the shoots bore flowers) than topping the trees, removing a number of branches, strangulation, cutting roots, applying fertilizer, etc.

(ii) *The raising of planting stock*, with emphasis on the need for producing standard stock suitable for use with planting machines and on the rôle of physical and chemical properties of nursery soils, followed by notes on cultivators, seed drills, lifting and packing machines, etc. Detailed results are included of some experiments, under the author's supervision, on the effects of lime, artificial fertilizers, natural and liquid manure, and compost, singly or in combination, and of watering, on the physical and chemical properties of nursery soils. Further work was planned, but it was evident by 1940 that in both acid sandy and practically neutral clay-loam soils the application of lime and natural or liquid manure decidedly improved the chemical properties of the soils. In the last year reported on, the use of forest litter as an organic manure had uniformly favourable results. Tables are included showing the effects of the treatments on root length and root and shoot weights for Pine and Larch seedlings. Preliminary conclusions as regards the raising of standard nursery stock are (*a*) On sandy soils the length of the root system often exceeds 25 cm. in the second year; this is longer than desired for use with planting machines, and the raising of 1-year stock is therefore recommended. (*b*) Manurial treatments were more beneficial on the sandy soils, where Ca + natural manure, Ca + N + P, [? wood] ash, or compost gave particularly good results with Pine. On the clay-loam Ca + natural manure, and, in the case of Larch, Ca alone, gave good results.

(iii) *Direct sowing and planting on cultivated sites*, with accounts of soil cultivation and cultivators of various types; direct sowing and seed drills; planting and planting machines; tending operations and machines suitable for this purpose; plantations of Osiers and of *Euonymus verrucosus*; brief notes on protection against diseases and pests (including a recommendation of 0·15-per-cent. formalin as a seed treatment for Pine, Larch, etc., against *Fusarium*, and a strong warning against chloropicrin as a soil fumigant, since it kills neighbouring plant growth as well as cockchafer larvae); and notes on tractors.

Parts II and III deal very briefly with the need for different types of plantation for

different regions, the organization of work, and economic questions.

[1728]. 23.2 (54.1) : 76.1. ALI, A. **Wartime plantations in Darjeeling division.** *Indian For.* 72 (8), 1946 (350–3).

Description of a successful technique for regenerating clear felled areas in the Darjeeling Division, Bengal, using the seed of *Quercus lamellosa*, *Q. lineata*, and *Machilus odoratissima*, supplemented by nursery stock of *Michelia excelsa*, *Acer campbellii*, *Bucklandia populnea*, *Cedrela microcarpa* with nurse crops of *Alnus nepalensis*, *Betula alnoides* and *Prunus nepalensis*.

[1729]. 23.2 : 12.25 : 21.6 (485). EKLUND, B., and HUSS, E. Undersökningar över äldre skogskulturer i de nordligaste länen. **[Investigations on the older artificially regenerated stands in the northernmost counties [of Sweden].]** *Medd. Skogsforskn-Inst.* [*SkogsförsöksAnst.*] *Stockh.* 33 (6), 1946. pp. 104. [Sw.e.]

The data presented are derived from 57 artificially regenerated and 6 naturally regenerated stands of Scots Pine and Norway Spruce, dating from between 1902 and 1908, in various parts of Norrland. The early records for these stands were often far from complete. Conclusions from the study, so far as they are permissible in the circumstances, are:—

(i) Spring and early summer (May–June) sowings have given better results than autumn sowings, the difference appearing to be considerably greater in the southern than in the northern parts of the region.

(ii) In sowings of mixed Scots Pine and Norway Spruce, the latter has always lagged behind and the main storey is thus practically pure Pine. If the quality of the Pine is not to suffer, sufficient Pine stems must be present to form a satisfactory crop by themselves, hence in mixed sowings Pine seed should constitute the greater part. Further, mixed sowings should presumably be restricted to the better sites, where Spruce has a better chance of catching up.

(iii) The burning of clearings is clearly favourable; sowings on burnt areas have formed stands that have more stems per unit area, are less gappy, and have more main crop trees (both per ha. and in relation to total number of trees) than those on unburnt sites.

(iv) Residual trees left on felling sites have injurious effects on regeneration, hence sites should be effectively cleared before sowing or planting.

(v) So far as comparison is possible, strip sowings appear to have given rather more stems from the same amount of seed per unit area, fewer blanks, more main crop trees per ha. and more narrow-crowned trees, than have patch sowings. Strip sowing is presumably the preferable method on most of the 'fresh' (intermediate between moist and dry) sites which have a not over-luxuriant ground vegetation.

(vi) The plantings examined all had considerable numbers of branchy and broad-crowned trees of poor quality, and were usually sparse and gappy. Mortality has been considerably greater than in sowings, and future plantings should therefore be denser.

(vii) A few comparisons between sowings and natural regeneration on similar and adjacent sites suggest that on unburnt sites of a relatively dry type, natural regeneration (given good site preparation) can compete with sowings only to an elevation of 250–300 m. On burnt sites, other conditions being equal, its range of competitive ability is somewhat increased.

(viii) In sowings, narrow-crowned trees were more frequent, both absolutely and relatively, in stands of good numerical density. The number of main crop trees also increased with increasing number of trees per ha. or per recovered sowing plot.

(ix) Measurements of the diameter and branching angle of a number of branches in the green crown, including the thickest branch in the whorl at the point nearest to ¼ of the crown, reckoned from below, showed that: (*a*) Diameter of the thickest branch increases in the same proportion as d.b.h. In broad-crowned trees this branch is thicker than in narrow-crowned trees with the same d.b.h. (*b*) There is a positive linear relationship between diameter of the thickest branch and the greatest radius of the crown. (*c*) Low values for the quotient of height in m. and d.b.h. in cm. were associated with high branch diameters and *vice versa*. For the same form quotient, broad-crowned had thicker branches than normal- and narrow-crowned trees. (*d*) Trees with a narrow angle of branching usually had thicker branches than those with horizontal or downward-directed branches. For a given branching

angle the diameter of the thickest branch was on the average greater in broad-crowned than in normal- and narrow-crowned trees.

[1730]. 23.2 : 12.26–8. Eichennachzucht im Bestand. De la régénération du chêne dans le peuplement. **[Oak regeneration in the stand.]** *Merkblatt der Beratungsstelle für Waldsamenbeschaffung. (Mémorandum de l'Office de renseignements et conseils pour l'obtention de graines forestières).* No. 5, 1946. pp. 3. [G.F.] In *Suppls.* to *Schweiz. Z. Forstw.* 97 (10), 1946. German version pp. 23–5; French pp. 31–3.

Brief notes on choice of species (Pedunculate or Sessile), sowing methods, planting, nurse and auxiliary species for Oak in Switzerland.

[1731]. 23.2 : 12.26–8. Die Nachzucht des Walnussbaumes. La régénération du noyer commun. **[The regeneration of European Walnut.]** *Merkblatt der Beratungsstelle für Waldsamenbeschaffung. (Mémorandum de l'Office de renseignements et conseils pour l'obtention de graines forestières).* No. 6, 1946. pp. 2. [G.F.] In *Suppls.* to *Schweiz. Z. Forstw.* 97 (10), 1946. German version pp. 26–7; French pp. 34–5.

Brief notes on site preferences, seed questions, planting, auxiliary species and tending, applicable to Swiss conditions.

[1732]. 23.2 : 12.26–8 (81). Breves informações sobre a cultura do 'Jacaré'. **[Brief instructions on the cultivation of *Piptadenia communis.*]** *Brasil madeireiro* 2 (12), 1946 (32). [Port.]

[1733]. 23.2 : 12.26–8. Ullén, G. Ett par synpunkter på askodling. **[Notes on the rearing of Ash.]** *Skogen* 33 (19), 1946 (294–5). [Sw.]

Ash seed taken in September, when not quite mature, appears to give the best germination. Seed should be taken from parent trees of good growth and form, but female trees of good form appear to be rarer than males [cf. *For. Abstr.* 8 (No. 98)]. Ullén recommends sowing in the nursery as soon as the soil is dry enough in spring, in strips 6–7 cm. broad, 1 cm. deep and 20 cm. apart. A thin layer of Spruce brushwood may be advantageous as shelter where there is risk of drought. Nursery stock must be at least 1 m. high when planted out under shelterwood at a spacing of 1 m. or a little wider.

23.22. Preparatory Work. Auxiliary Measures

[1734]. 23.22 (410) : 07.7. Faulkner, R. **Moorland planting difficulties and the use of the R.L.R. forest plough.** *Arbor, Aberdeen* 1 (1), 1946 (14–5).

The R.L.R. Forest Plough, the largest plough of its kind ever manufactured, was designed by a Forestry Commission District Officer for use on moorland. The original design has now been improved by a replaceable, high-carbon-content steel tip to the share, which keeps maintenance costs down. The plough can be drawn by an International T.D. 9 caterpillar tractor. The advantages of the plough are complete breaking up of the pan, provision of ample disturbed soil to afford a suitable planting medium, elimination of weed growth and root competition (especially heather), lessening of fire risk. The chief disadvantage is the size of the furrow (1 ft. 6 in. × 1 ft. 4 in.), but much of the soil will have weathered back into the furrow before extraction. 'Extraction lanes' are left unploughed and unplanted at intervals of one chain. Ploughing of the whole area would provide admirable planting conditions but, in order to reduce expense, single furrows at 5-ft. intervals are the standard practice. Trees are planted against the side of the furrow adjacent to the out-turned furrow slice. Where the plough and an ordinary cultivator were used on alternate rows, the Scots Pine planted in the ploughed land is now far superior in colour of leaf, height growth, and root development.

[1735]. 23.22 (492) : 21.0 : 23.52. Kuhn, A. F. Ervaringen met herbebossching. **[Experiences in reforestation.]** *Ned. Boschb.-Tijdschr.* 13 (7), 1940 (350–1). [Du.]

On a clear-felled area, formerly under poor, open, second-generation Scots Pine, two methods of regeneration were tried:—

(i) Grass sod was removed in strips about 1½ m. wide and inverted on the unploughed strips (about 1 m. wide); after harrowing the pared strips, Birch and Rowan were sown and the seed harrowed in. The next year, 3-year-old Japanese Larch was planted in at a spacing of 1½ m. This plantation did very well, suffering no serious frost damage thanks to the auxiliary species. The Birch has needed cutting back here and there. In snowfalls, Rowan has been preferred by rabbits, to the

benefit of the Larch, which at 10 years was about 4 m. high. The sod decomposed well. A portion was planted with Kurile Larch, which did very poorly and had poor stem form.

(ii) After complete ploughing, Douglas Fir and Larch were hole-planted in groups of about 40. *Prunus*, Grey Alder, Spanish Chestnut were used as fillers, with random spacing. Both Larch and Douglas Fir have suffered yearly from frost, mortality has been very high compared with (i), and the plantation is gappy, with branchy, crooked trees. Grass did not re-colonize, but the sod decomposed poorly. Rabbit damage has been severe, especially to the hardwoods.

[1736]. 23.22 : 11.47.13 (492). JANSEN, J. J. M. De grondbewerking bij herbebossching. [**Soil cultivation for artificial regeneration.**] *Nederl. Boschb.-Tijdschr.* 18 (9), 1946 (206–9). [Du.]

Nature of subsoil will determine whether cultivation should be deep or shallow; in either case it is important to provide, if necessary, for adequate drainage, and to see that the humus layer is not deeply buried. Where an impermeable layer such as iron-pan or black peat exists, deep cultivation should be carried out with a subsoiling plough or by spade digging, and if part of the old stand is to remain, spade-dug strips should be used for the young crop. If deep cultivation was done for the preceding crop, it is unnecessary and in some cases injurious to repeat the process. Where the subsoil is permeable, shallow cultivation should be used: this should take the form of full ploughing or digging if the site is heavily overgrown, or of strip ploughing or digging on less heavily vegetated ground. Strip cultivation or planting holes should be used where stumps or portions of the old stand remain.

If the humus is entirely removed, phosphate may be applied at 300–500 kg./ha. and disked in. Liming or marling should be done at 2,000–3,000 kg./ha. and mixture of the lime and humus assisted by some form of cultivator. On the whole, preliminary crops of lupin followed by one to several years of agricultural use, is not advised, as the impoverishment of the soil combined with weed growth may be detrimental to the forest crop.

[1737]. 23.22.1 : 07.7 : 23.13. SMITH, C. Redskabsfremvisning paa Bregentved Skovdistrikt den 25. Maj 1946. [**Demonstration of implements in Bregentved Forest District, 25 May 1946.**] *Dansk Skovforen. Tidsskr.* 31 (9), 1946 (449–67). [Dan.]

Illustrations of 13 types of cultivator, with brief notes on their performance. Types demonstrated included a Siemens 'Fræser', three kinds of disk harrow, Fromsejer's double ridge- and subsoil-plough, and several types of spring- and rigid-toothed harrows.

[1738]. 23.22.2 (54.1). SHEBBEARE, E. O. **Northern Bengal taungyas.** *Emp. For. Rev.* 25 (1), 1946 (32–5).

The writer adversely criticizes the tendency to concentrate on the 'fashionable' species of the moment, raising pure crops of it on all kinds of sites, until its besetting pest appears on a large enough scale to cause a panic and complete abandonment of that species. The heavy war-time fellings of taungya plantations have caused a new problem, since labour is not available for replanting and tending of the large clear-cut areas. It is suggested that in these cases working-plans should be revised and only a small area of the best land planted with long-rotation species, the rest being filled with quick-growing fuel species capable of growing about 25 cords to the acre on a rotation of 10 years or less. Better conditions for forest villagers, including adequate fencing against wild animals, are necessary.

23.23. Sowings

23.23.1. *Seed Procurement, Treatment, and Testing*

[1739]. 23.23.1. POURTET, J. Les semences forestières et le reboisement. [**Forest seeds and reafforestation.**] *Rev. Eaux For.* 84 (8/9), 1946 (521–35). [F.]

An account is given of the collection of forest seed in France during the past century and the causes of its increasing inferiority. Since 1941 it has been legally necessary for all seed to be sold with a certificate of origin from the Research Station at Nancy, but in practice it has not been possible to enforce this condition. Notes are given on methods of collecting, extracting, treating and storing seed.

[1740]. 23.23.11 : 12.25 : 12.26–8 : 12.11.11: 12.11.21 : 21.8 : 21.32. NĚMEC, A. O chemickém složení semen jehličnatých dřevin.

[On the chemical composition of seeds of conifers.] *Repr.* from *Lesnická Práce* 23, 1944 (65–75). [Cz.g.] [1741]. NĚMEC, A. O chemickém složení semen listnatých dřevin. **[On the chemical composition of seeds of hardwoods.]** *Repr.* from *Lesnická Práce* 25 (1/2), [1946?] (1–14). [Cz.f.]

In general, higher P_2O_5 and MgO contents are characteristic of conifer seed, and higher K_2O and CaO contents of that of hardwoods. The extremes for percentage contents of the principal nutrients differed in the two groups (hardwoods in brackets) thus: K_2O 0·527–1·282 (0·371–4·260); CaO 0·041–0·238 (0·123–1·759); MgO 0·302–1·048 (0·199–0·968); SiO_2 0·209–6·163 (0·027–1·045); P_2O_5 0·803–2·645 (0·356–2·558). The high SiO_2 content of the conifers appears not to be due to site factors and its physiological significance is unknown.

It is estimated that in full seed years the demand for certain nutrients for seed production in the more exacting species may amount to several times the requirements for a year's wood increment, and attention is drawn to the occurrence of seed years for species needing considerable amounts of nutrients for seed production, e.g. Pine, Spruce, Beech, at longer intervals than for species less exacting in this respect, e.g. Larch, Silver Fir.

[1742]. 23.23.15 : 12.25. VILMORIN, R. DE. Note sur la conservation de la faculté germinative des graines d'*Abies pectinata*. **[Note on the conservation of the germinative capacity of the seed of *Abies alba*.]** *C.R. Acad. Agric. France* No. 17, 1944 (509–12). [F.] I.I.E.

Untreated seeds of *Abies alba* retain complete germinative capacity for at least a year if stored in darkness at a temperature in the neighbourhood of – 10°. Storage in a vacuum or an inert gas is unnecessary.

[1743]. 23.23.15 : 12.25–8. NESTLER, R. B. **Germination of seeds of some wild and cultivated plants after 5½ years of storage.** *J. For.* 44 (9), 1946 (683–4).

The seeds tested in this experiment were obtained in 1939, stored until June 1941 in sacks in a dry place in Maryland at room temperature, then kept in a cold storage chamber at 32° to 33° F. till June 1943, and at 0° F. from June 1943 until July 1945. They were then returned to room temperature until autumn, when they were tested for germination and hard seeds. Of the tree species tested, *Pinus palustris* showed no germination, *P. ponderosa* 5 per cent., *P. echinata* 14 per cent., *P. taeda* 22 per cent., and *Robinia pseudoacacia* 74 per cent.

[1744]. 23.23.19 : 12.26–8. CHENG, KWEI-SHUNG. **Studies on the germination of forest seeds and the development of their seedlings relative to the size, weight and specific gravity of the seeds.** *J. agric. Ass. China* No. 180, 1945 (v–vi, 65–75). [Chin.e.]

Results of germination tests of seeds of *Juglans regia*, *Prunus persica* and *Quercus variabilis* showed that germination percentage and seedling development are directly correlated with the size, weight and specific gravity of the seeds. *From English summary.*

[1745]. 23.23.15 : 12.26–8 : 12.13 : 21.8. COX, L. G. **A physiological study of embryo dormancy in the seed of native hardwoods and Iris.** *Abstr. Theses Cornell Univ. 1942*, 1943 (354–7). Biol. Abstr. 19, 1945 (22794).

Seeds of the following species were investigated: Red Oak (*Quercus borealis* var. *maxima*), Red Ash (*Fraxinus pennsylvanica*), White Ash (*F. americana*), Black Ash (*F. nigra*), Black Cherry (*Prunus serotina*), Sugar Maple (*Acer saccharum* (?)), and bearded Iris hybrids. Data were obtained which support the concept of correlative inhibition.

The after-ripening process appeared to be localized in the storage organs (i.e. cotyledons or endosperm). The dormancy of the seed of Red Ash was primarily due to structures limiting the supply of oxygen to the embryo. This difficulty could be overcome by removal of part of the endosperm from over the radicle or by treatment with concentrated H_2SO_4. Dormancy of Black Ash and White Ash seeds was primarily due to readily-diffusable inhibiting substances in the endosperm. Inhibiting substances in storage tissues were found in non-after-ripened seeds of Red Oak, Black Cherry, Sugar Maple, and White Ash; such substances were not found in completely after-ripened seeds of Red Oak, Sugar Maple and Black Cherry. The mechanism of inhibition involved enzyme inactivation, particularly of the respiratory system.

[1746]. 23.23.15 : 12.26–8 : 12.14.7 : 12.11.1. SHUMILINA, Z. K. Stratifikatsiya

semyan drevesnykh i kustarnikovykh porod. [**Stratification of seeds of tree and shrub species.**] Goslestekhizdat, Moscow. 1940. pp. 68. [Russ.]

A report on research, largely in the Stalingrad region, on seed of: *Acer platanoides, A. pseudoplatanus, A. tataricum*; *Amygdalus spinosissima, A. bucharica*; *Elaeagnus angustifolia, Euonymus verrucosus, Fraxinus excelsior, Juglans manshurica, J. regia, Pinus cembra, Pistacia vera, Prunus armeniaca, P. cerasus, P. persica, P. spinosa, Pyrus communis, P. malus* and *Tilia parvifolia.*

Chapter 1 deals with: (*a*) period of initial swelling and amount of water absorbed; (*b*) influence of the outer coat on germination, and 'period of preparation of seed for germination' (which is considered an apter term than period of dormancy, since the embryo continues to grow and metabolic changes occur). Seeds are grouped into five classes according to the factors affecting ease of germination.

Chapter 2 deals with basic factors affecting the technique of stratification, including: (*a*) Stratifying media (sand, peat, etc.) differing in aeration, moisture and acidity. (*b*) Alternating or constant temperatures. (*c*) Seed condition (from early or late seed collections, dry or moist, husked or with pericarp intact). (*d*) Periods (autumn, summer or winter). Box and trench methods of stratification are discussed in detail, with diagrams. Three types of trench are described and illustrated: (*a*) Summer type: 30–35 cm. deep, with no special drainage space, 0·5 m. wide, surrounded by a 10-cm. earth ridge with a plank roof covered with 10–15 cm. of straw or the like; (*b*) Warm (winter) type: 80 cm. deep, 1 m. wide, not more than 2 m. long, with drainage space at the bottom and ventilation by a central line of upright bundles of reeds, seed covered with a straw layer of up to 1 m.; (*c*) Cold (winter) type: 60 cm. deep, 1 m. wide, with bottom drainage space but no special allowance for top ventilation, covered with a straw layer 10–15 cm. deep. Types (*b*) and (*c*) are also surrounded by a low earth ridge as for (*a*). Towards the end of winter the straw of types (*b*) and (*c*) is removed, a snow layer about 1 m. deep provided to avoid premature germination, and straw replaced over the snow to prevent thawing.

Chapter 3 is a summary of experimental results and recommendations for stratification by species, which include: *Tilia parvifolia*:—For spring seedlings, use seed collected early and either stratified immediately in a summer trench and sown in late autumn, or stratified moist (or partly dried for about 2 weeks in a cellar at a 10° C.) for about 50 days, then taken out and placed under the snow or in cold trenches, and sown in spring. If the seed is dry it should be soaked in water for about 4 days before stratification. Seed collected late should be stored till the following summer in a cool place, stratified in June and sown in late autumn.

Elaeagnus angustifolia:—(1) Sowing can be done in September after simple removal of the pericarp; later sowing of such seed is not recommended where soil freezing or a dry autumn may be expected. For late autumn sowings, only seed stratified in summer trenches should be used, in a dry or moist condition. (2) For spring sowing seed should be stratified in autumn in cold or warm trenches, but if stratification is done before November, cold trenches give better results. (3) Winter stratification 3½–4 months prior to sowing also gives good results. In this case stratified seed should be kept for about 3 months in a cellar at 0–10° C. and then placed under the snow.

Acer tataricum: (1) Seed can be sown in September, or stratified in summer trenches and sown in late autumn. (2) For spring sowing the seed may be prepared by stratifying in autumn in cold or warm trenches, the former being preferable for seed stratified in September–October, the latter for that stratified later. (3) Seed may be stratified in winter, but not later than 4 months prior to sowing, the best results being obtained by storage in a cellar (at 0–10° C.) for 2 months with subsequent storage under snow for the second 2 months. (4) Late autumn sowing of unstratified seed gives poor results.

Acer platanoides. (1) The most effective method is storage of seed in a layer 10–15 cm. deep under snow for 3 months prior to sowing, and retention under snow until actually required; this method makes it unnecessary to mix the seed with sand. (2) Good results were also given by stratification in December for 2 months in a cellar at 0–10° C. with subsequent storage under snow. (3) Stratification of seed in autumn in 'summer' trenches gave good results, but is not recommended as it requires frequent inspection, and the seed is apt to sprout before sowing. (4) Autumn sowing is not advisable, owing to possible damage to seed

in winters with a poor snowfall and sharp temperature changes.

Acer pseudoplatanus: Best results were obtained with seed stratified for 3 months prior to sowing (stored in a cellar for 1½ months and then placed under snow for 1½ months).

Fraxinus excelsior: (1) Seed collected in the previous summer should be stratified during July–August in 'summer' trenches and either sown in late autumn (towards the end of October), or transferred to 'winter' trenches for spring sowing. (2) In moist climates, seed may be sown in summer instead of being stratified.

Recommendations are also included for *Pyrus malus*; *Prunus cerasus*; *P. domestica*, *P. spinosa*, *Crataegus oxyacantha*; *Euonymus verrucosus*, and *Corylus avellana*.

23.23.3. *Methods of Sowing*

See also *For. Abstr.* 8 (No. 1660).

[1747]. 23.23.3 : 07.7. **Walking stick seed planter.** *Timberman* 47 (10), 1946 (62, 64).

Description of a new tool developed by the Oregon State Forestry Department, which is a modification of the cornplanter type. It weighs only 5 lb. and is very simple to use. The basic type has been improved by making the instrument lighter in weight and equipping it with a sharp wedge-shaped blade that loosens the soil for seed placement.

[1748]. 23.23.3 : 23.24 : 23.51 (492). GEURKEN, J. Als het getij verloopt, verzette men de bakens. **[Cutting one's coat to suit one's cloth.]** *Nederl. Boschb.-Tijdschr.* 18 (10), 1946 (227–30). [Du.]

Workers' wages in Holland have risen by 125–150 per cent. during the war, and to help offset the consequent increase in establishment costs, the author suggests the following expedients: (*a*) *Direct sowing of conifers on unworked ground*:—This has been successfully employed in 1928–30 for Scots Pine on rather stiff yellow-brown heath soil with no iron-pan, seed being sown at 4 kg./ha., sanded over, and the ground harrowed. Results have been good so far: the sowings have made slower growth but better form than planted stock. It is believed that deep cultivation might also be dispensed with where a soil pan exists at depths of 40–45 cm., but not when a shallower pan is present. (*b*) *Direct sowing of conifers on worked ground*:—To avoid the cost of digging, it should suffice to disk-harrow, plough, leave the site for at least one but not more than two years, sow Scots Pine at 3–4 kg./ha. in the furrows, and cover with ½–1 cm. of sand, but in this case harrowing-in should not be done. Direct sowings of the early 1920's made by this method have all succeeded and there has been no serious trouble with *Lophodermium* or *Retinia*, in contrast to a number of failures in planted stands. It is emphasized that a rough soil surface offers valuable protection to seedlings and that sowings should only be made on soils that are not too fine in texture and not liable to powder and blow. (*c*) *Underplanting of old open stands*:—The usual method is to plant with 3- to 4-year Douglas Fir, Larch, or hardwoods, in dug holes; but it is possible that 1- to 2-year plants might succeed, especially if planted the year after preparation of the holes. Experiments should be made on this point. (*d*) *Direct sowing of mixtures*:—The larger seeds, e.g. acorns and Beech mast, are sown on ploughed or dug ground, worked in by harrowing, and directly afterwards the conifer seed, e.g. Larch, Pine, is sown and no further soil cultivation done. The last point is important as harrowing in this case renders the soil liable to compaction after rain and failures may be more frequent.

23.24. Formation of Stands by Planting

[1749]. 23.24 : 12.25 (941). STOATE, T. N. **Pine establishment: a further report on a study from 1932 to 1945 of initial survival in plantations of Cluster Pine (*Pinus pinaster*) in Western Australian coastal plantations.** *Bull. For. Dep. W. Aust.* No. 53A, 1946. pp. 20.

The results of the first 7 years of an investigation into the establishment technique for *Pinus pinaster* were published in an earlier bulletin [see *For. Abstr.* 1 (265)]. The present report deals with results from the second 7 years, which were analysed statistically by factorial analysis. The study produced mainly negative results. Except for extremes of treatment which would probably not ordinarily be reached in practice, practically no factor, except cultivation, has had any effect on survival

in the first summer. Some cultivation is necessary in both the plantations investigated. Only the very smallest and poorest stock, which would ordinarily be discarded at lifting, has given lower results than the sturdiest dominants from the nursery lines. It appears that no root pruning is necessary beyond the removal of the odd long laterals which develop in sand nurseries. The many factors, such as disposing the roots in planting, method of lifting, packing the sand round the roots, heeling in, wrenching, watering the plants, keeping the plants in bundles for several days, opening up of the planting hole in advance, notching, etc. have had no effect. Extensive repetition of the experiments over the years appears to have carried the work with most of these factors beyond reasonable doubt. Despite these negative results, failures sometimes occur, which are, so far, inexplicable.

23.24.1. *Planting Material*

[1750]. 23.24.1 : 12.26–8. NYASALAND. **Annual report of the Forestry Department for the year ended 31st December, 1945.** Govt. Printer, Zomba. 1946. pp. 16.

Tests of planting 'stripped' plants of Mbawa (*Khaya nyasica*), i.e. large plants with the leaves removed and the roots pruned, have shown advantages over the usual planting of smaller plants with full foliage. The tests will be continued with the object of ascertaining the maximum size to which nursery stock so treated may be successfully used for planting on stream banks where the heavy growth of grass is a difficulty (p. 4).

23.24.2. *Methods of Planting*

See also *For. Abstr.* 8 (No. 1660).

[1751]. 23.24.2 : 07.7. **Machine plants 9,000 seedlings in eight hours.** *W. Cst. Lumberm.* 73 (9), 1946 (66, 102).

Description of a mechanical tree-planter manufactured by the Waldron Machine Works, Valdosta, Ga., and designed for use in planting old fields and open land. Mounting the planting device on a larger tractor for use in the woods would provide the necessary flexibility for dodging stumps, etc.

23.26. Plant Rearing. Nursery Practice

See also *For. Abstr.* 8 (Nos. 1604–8, 1727).

[1752]. 23.26 : 07.7 (47.0). D'YAKOV, G. S. Mekhanizatsiya gryadkovÿkh kul'tur na pitomnike. [**Mechanization of nursery bed cultivation.**] *Trud. vsesoyuz. nauchno-issledov. Inst. lesnogo Khoz.* No. 12, 1940 (151–68). [Russ.]

Descriptions of nursery implements for large-scale nursery work, including a cultivator with 4 ridging-type plough members, mounted abreast, for making beds, 3 types of horse-drawn seed drills, and implements for preventing soil crusting.

[1753]. 23.26 : 23.23.1 : 23.24.1 : 12.11.3. ENANDER, M. Val av fröträd samt sortering av frö och plantor av tall och gran. [**Choice of seed tree and grading of seed and plants of Scots Pine and Norway Spruce.**] *Svenska SkogsvFören. Tidskr.* 44 (4), 1946 (310–28). [Sw.]

(i) *Seedbearers*: Trees above the mean for the stems of best dimensions in a stand can be regarded as extreme 'plus variants' and it is recommended that these should be retained as seedbearers until natural regeneration is obtained, then removed in a good seed year when the seed can be collected for use in nurseries or for direct sowings. For the latter purposes the seed trees should be as uniform as possible and seed from different stands should be kept separate.

(ii) *Seed grading*: The general showing of trials has been that larger, heavier seed gives initially better plants though the early superiority in this respect is later smoothed out. This is a further reason for not mixing seed from trees of different age or from different stands, as plants from larger seed, e.g. from younger trees, may stifle those—possibly of better genetic quality—from the smaller seed of old trees. Grading should be first by parent stand or tree and secondly by weight. The heavier grades may be used for direct sowing, where competition or liability to damage render a good start desirable, and the lighter ones for nursery sowings. Winnowing machines for seed grading are under trial. The uneven crops obtained in Sweden from direct sowings might well have been more uniform if graded seed had been used.

(iii) *Plant grading*: Reference is made to previously published evidence in favour of grading nursery stock [cf. *For. Abstr.* 8 (No. 208)]. A first-class nursery on deep-drained mull/sand, in an open position and preferably on level ground, is desirable, and good cultivation and watering facilities are necessary [cf. *For. Abstr.* 7 (No. 1763)]. Sowings should be comparatively thin; grading should begin only after two years and should be done yard by yard so as to select the relatively best seedlings irrespective of seedbed variations.

(iv) *Correlations between heights at different ages*: High coefficients of correlation (0·80–0·96) were found for the heights of Scots Pine at Rö at 5 and 15 years of age, Scots Pine in Sjuenda Crown Park at 10 and 27 years, and Scots Pine and Spruce nursery stock at Ultran as 2/0 and 2/1 stock. The author's stem analyses of 'plus' and 'minus' variants in artificial even-aged stands also indicate that the dominants were taller than the dominated trees even in the plant stage.

(v) Strict grading of stock is likely to give better establishment, allow of increased spacing and give more uniform and better-quality stands. It is stressed that the use of ungraded seed or plants may vitiate the results of plantation trials.

[1754]. 23.26 : 33.36. MASSACHUSETTS. **Massachusetts Agricultural Experiment Station: annual report for the period ending June 30, 1944.** *Bull. Mass. agric. Exp. Sta.* No. 417, 1944. pp. 78.

Where creosote fumes are formed in confined spaces, such as cold frames, there is certain to be serious injury to plants. Creosoted timber covered with soil did not prove harmful to germination or to the growing plant in experiments, but where the creosoted wood was above the soil line and consequently above the leaves, as in a sown flat, injury occurred, appearing first as a rolling of the leaves. Continuous exposure to the fumes eventually killed the plants. Weathering of treated wood may reduce the intensity of the injury, but cabbage plants showed considerable injury from wood known to have been creosoted 6 years previously (p. 22).

23.27. Arboriculture

[1755]. 23.27 (54) : 21.0. RANDHAWA, M. S. **A tree plantation plan for India. (ii) Avenues for town roads.** *Indian For.* 72 (6), 1946 (267–71). [Imperial Council of Agricultural Research, New Delhi.]

Roadside avenues should be planted solely for shade and ornament. On wide roads an avenue should have an outer row of one evergreen shade species at 30 ft. apart, and an inner row of one or more ornamental species employing a pleasing colour scheme. Lists of species are given.

23.3. *Afforestation*

[1756]. 23.3 (410) : 2. **Afforestation.** *Tech. Notes For. Comm., Lond.* Sect. I, 1946. pp. 50.

In this work an attempt is made to place on record for the guidance of post-war forest officers and foresters the more arresting facts which have come to light since the Forestry Commission commenced operations. No attempt is made to cover the elements of forestry, but attention is drawn rather to specialized aspects which have been found to be of outstanding importance. There are chapters on the lay-out of plantations, preparation of ground, fencing and warrening, choice of species, planting, beating-up, weeding, racking, cleaning and brashing, tending and thinning, pruning, underplanting; also lists of forest trees and shrubs, soil indicators, miscellaneous plants, nursery weeds, and common birds.

[1757]. 23.3 (44). DUGELAY, A. Le reboisement dans la zone méditerranéenne provençale. **[Reafforestation in the Mediterranean zone of Provence.]** *Rev. Eaux For.* 84 (8/9), 1946 (492–506). [F.]

A review of the evil consequences of simultaneous deforestation and depopulation in the hinterland of the Mediterranean coast of France, amongst which the most striking are severe and increasing erosion and water shortage.

[1758]. 23.3 (44). GONNEVILLE, G. DE, and DUVAL, A. Le reboisement en Bretagne. **[Reafforestation in Brittany.]** *Rev. Eaux For.* 84 (8/9), 1946 (462–72). [F.]

A review of the whole subject including reafforestation already carried out, the economic possibilities of future reafforestation, choice of species, technique of reafforestation. The

principal obstacles to large-scale planting are the acidity of the soil, strong winds, the large number of very small peasant holdings, and the value of wastelands as a source of pasture and litter.

[1759]. 23.3 (44). GUISLAIN, A. Le reboisement dans les Pyrénées occidentales. **[Reafforestation in the western Pyrenees.]** *Rev. Eaux For.* 84 (8/9), 1946 (507–17). [F.]

A review of the achievements of the Département des Eaux et Forêts in reafforesting large areas of the Western Pyrenees. The chief obstacle in the way of further progress is the use of waste lands as a source of litter, owing to the great shortage of straw in this region, which makes the communes unwilling to undertake their planting.

[1760]. 23.3 (44). GUISLAIN, A. Le reboisement des saligues du gave de Pau. **[The reafforestation of the 'saligues' of the torrent of Pau.]** *Rev. Eaux For.* 84 (10), 1946 (619–32 + plates). [F.]

An account of the thickets of Willow, Alder, Poplar, and *Robinia* on the flood plain of the torrent of Pau, and suggestions for bringing them under management and converting them unto useful plantations of Poplar and Plane.

[1761]. 23.3 (44). ROUX, G. Le reboisement dans la région landaise. **[Reafforestation in the region of the Landes.]** *Rev. Eaux For.* 84 (8/9), 1946 (473–91). [F.]

Of the 900,000 ha. of forest in the Landes, some 300,000 ha. have been denuded during the war as a result of fires, and natural regeneration is lacking over another 100,000 ha. of cut-over land owing to soil degradation. The writer discusses the difficulties in the way of replanting this area with Maritime Pine (principally shortage of seed) and the objection to such a course even if it were practicable. These vast, pure stands of a highly inflammable, light-demanding species are particularly susceptible to fire and to insect attack. The measures recommended are soil improvement, principally by improved drainage, construction of a network of forest roads bordered by ditches, to serve simultaneously for drainage, transport, and fire breaks, organized collection and extraction of seed, and the planting of Pine in mixture with deciduous species which will at once reduce fire hazard and form humus. An account is given of those indigenous and exotic species which have been successfully tested on Landes soils and suggestions made of other species which might be tried.

[1762]. 23.3 (44) : 12.26–8 : 22 : 47. SERRE, G. DE LA. Le châtaignier et le reboisement. **[The Chestnut and reafforestation.]** *Rev. Eaux For.* 84 (8/9), 1946 (557–65). [F.]

The relative values of the indigenous *Castanea sativa* and the Japanese species are discussed. The writer believes that, though the latter is valuable in the limited areas where it will grow, on account of its comparative freedom from disease, the indigenous species should still be planted, even in areas where die-back of Chestnut occurs, provided that it is planted on ground which has not grown Chestnut for many years, and that the trees are tended as orchard trees. They should be planted in single or double rows, with a minimum spacing of 15 metres. Chestnut forest and coppice are seldom attacked by die-back, which is mainly a disease of orchard trees.

[1763]. 23.3 (492) : 24 : 22.83. BLOKHUIS, J. L. W. De verpleging van de jonge bosschen in Drenthe. **[The tending of young forest stands in Drenthe.]** *Ned. Boschb.-Tijdschr.* 18 (8), 1946 (170–5). [Du.]

[1764]. 23.3 (494) : 21.0 : 12.26–8. HESS, E. Le rôle des feuillus dans la reforestation. **[The role of hardwoods in reforestation.]** *Beiheft zu den Zeitschriften des Schweizerischen Forstvereins* No. 19, 1940. pp. 36. [F.]

[1765]. 23.3 (76.8) : 21 : 12.19 : 11. MINCKLER, L. S. **Old field reforestation in the Great Appalachian Valley as related to some ecological factors.** *Ecol. Monogr.* 16 (2), 1946 (87–108). [Appalachian Forest Exp. Sta., Asheville, N.C.]

Results are given of old-field reforestation experiments in the Great Appalachian Valley on 700 plots established in 1938 and 1939. Plantation mortality was affected by first-season rainfall, aspect, slope steepness, soil, rodents, and density of vegetation. The hardwoods and White Pine were most affected, and Shortleaf Pine least affected by factors decreasing available moisture. Oak, Black Walnut and Sweet Gum suffered heavy damage from rodents. Very dense vegetation caused heavy mortality

of Shortleaf and White Pines. Species making good growth on a given site class tended to have good survival on the same sites. All species, except Sweet Gum, made better growth during the first 5 years when planted in an especially moist season (1938) than when planted in a dry year (1939). This difference was especially marked during the 3rd year and tended to diminish during the 4th and 5th years. Growth for all species was 1·4–5·1 times as fast in the 4th and 5th as in the 2nd and 3rd years. Except for Shortleaf Pine, this increase of growth after 3 years was considerably greater for those plantations established in the dry year. The species studied in this series of experiments are considered separately and their response to soil-site and vegetation factors described. Black Walnut, Yellow Poplar, various Oaks, Black Locust, White Ash and Sweet Gum were most sensitive to site conditions, with Shortleaf Pine the least sensitive and White Pine intermediate.

Mixtures arranged as a checkerboard with 9-tree squares were successful where the growth rates and survival of the species mixed were compatible on the particular site planted. Old-field stands of Sassafras can be successfully underplanted with species adapted to the site. Understocked stands of Shortleaf Pine can be interplanted in openings with a diameter at least twice the height of the adjacent trees.

Results are combined and integrated in a planting chart which is intended to serve as a practical guide for foresters and others engaged in reforestation work. *From author's summary.*

[1766]. 23.3 (81) : 12.26–8 : 23.2. A Acácia negra no reflorestamento das terras esgotadas. Breves instruções sôbre sua cultura. **[Black Wattle in the reafforestation of exhausted soils. Brief instructions for its cultivation.]** *Brasil madeireiro* 2 (12), 1946 (4). [Port.]

24. TENDING OF STANDS AND TREES

24.2. *Thinnings*

[1767]. 24.2 : 12.25 (71.3) : 24.5. MULLOY, G. A. **Thinning Red Pine, Rockland, Ontario (1943). Projects P. 38–39.** *Silvic. Res. Note Dom. For. Serv.* No. 79, 1946. pp. 29 + figs.

A plantation of 15 acres of pure Red Pine, established in 1914, has grown very fast, reaching a maximum diameter of 10 in. and a maximum height of 50 ft. in 29 years. Part of the stand was thinned at 24 years of age, and the thinning greatly accelerated the production of merchantable volume. Current annual growth rate on the unthinned stand is 340 bd. ft. per acre, while that on the thinned stand is 684 bd. ft. per acre. This acceleration was due, to a large extent, to the increased rate of diameter growth of the larger trees in the stand. Height growth was not affected by thinning. The stand is in the stage of most rapid height growth, increasing in height at the rate of nearly 2 ft. per year. Thinning eliminated, to a large extent, damage to the tops of trees from a recent ice storm which caused serious damage by top breakage to the unthinned stand. The benefit of holding this Red Pine stand at a density of 300–350 S.D.I. has been demonstrated. *From author's summary.*

24.3. *Opening of the Canopy. Release and Improvement Fellings (including Poisoning and Girdling)*

[1768]. 24.3 : 12.25 : 76.1 : 82. HASEL, A. A. **Logging costs as related to tree size and intensity of cutting in Ponderosa Pine.** *J. For.* 44 (8), 1946 (552–60). [California Forest and Range Exp. Sta., Berkeley, Calif.]

Logging output records taken in logging the Black Mountains Experimental Forest were used to determine the effect of tree size and intensity of cutting on logging cost. The study indicates that, in this stand of uneven-aged but predominantly overmature Ponderosa Pine of the northeastern lava plateau of California, light cuts are economically feasible in areas accessible from roads. Compared with cutting under present marking practice on Forest Service timber sales, sanitation-salvage cutting, removing less than one-third as much volume, cost less than 7 per cent. more in terms of man-minutes per 1,000 bd. ft. Cutting under Forest Service marking practised before 1938 costs the same per 1,000 bd. ft. as sanitation-salvage cuts in which about one-fifth as much volume is removed. Differences in cost are due almost entirely to tree-size make-up of stands marked rather than to intensity of cutting.

A method of allocating logging time to individual trees by the method of least squares is demonstrated. The necessary records include daily log-making output by crews, and

yarding and loading time per load. Trees and logs are numbered for identification of volumes in the scale record. Results from these output records are sensitive to differences in tree size, crew efficiency, equipment, and intensity of cutting. With the possible exception of yarding time, the records may be kept throughout the season at very little additional expense and are truly representative of the operation. They yield essentially the same information as that derived from detailed stop-watch timing of crews and do not require additional men. *Author's summary.*

[1769]. 24.3 : 12.26–8 (73). HOUGH, A. F. **Improvement of second growth northern hardwoods by cordwood thinnings.** *For. Mgmt. Note Ntheast. For. Exp. Sta.* No. 1, 1946. pp. 4.

Thinnings in well stocked 40- to 50-year-old second-growth northern hardwoods on good sites give the following results:—(1) Improve the periodic volume growth per acre within 2–4 years after treatment. Untreated stands grow at the rate of 1·0–1·2 cords per acre per year during the first 40–50 years and at an even slower rate during the last 5 years. After the proper degree of thinning the residual stand grows at the rate of 1·4 to 1·8 cords per acre per year, while unthinned stands continue at the rate of 1·0–1·2. (2) Increase the proportion of trees of vigour classes 1 and 2 in the residual stand. (3) In many cases increase the proportion of desirable species in the residual stand. Thinning should not be carried out in a single operation. A first thinning should remove not more than 30–40 per cent. of the total basal area or cubic-foot volume. On sites subject to glaze or wind damage it will be desirable to remove even lighter cuts, to avoid large breaks in the canopy.

[1770]. 24.31 : 12.26–8. FISHER, C. E., FULTS, J. L., and HOPP, H. **Factors affecting action of oils and water-soluble chemicals in Mesquite eradication.** *Ecol. Monogr.* 16 (2), 1946 (109–26).

Studies were made of some of the factors affecting the action of water-soluble chemicals and oils in eradication of Mesquite [*Prosopis juliflora*]. Morphological studies showed that the dormant buds on the underground stems must be destroyed in order to kill the plant. The movement of sodium arsenite takes place through the vascular system longitudinally with little or none tangentially. Downward movement is restricted by the presence of living tissues in forked stems and also by areas of dead tissue between the point of application and the critical zone of the dormant buds. The extent of penetration of sodium arsenite is directly related to the length of time it remains in contact with moist sapwood. To be effective the sodium-arsenite solution should be applied immediately after the sapwood is prepared, and at a concentration of at least the equivalent of 4 lb. of As_2O_3 per gallon, in order to give a consistently high percentage of kill.

Kerosene must be placed in direct contact with the critical dormant-bud zone in order to kill Mesquite. In general, the most successful kills were obtained during the summer, when the surface soil was dry. Successful kills with kerosene were obtained on single or few-stemmed trees with an average of one quart per tree, and on many-stemmed Mesquite with two quarts of kerosene per tree.

Of the many water-soluble chemicals tested, none has been found that is more effective and economical than sodium arsenite. Kerosene, diesel oil, and other petroleum oils were equal in their effectiveness and the choice among them depends on cost and availability. The addition of oil-soluble chemicals did not increase toxicity or percentage of kill. *From authors' abstract.* [Cf. *For. Abstr.* 8 (588).]

[1771]. 24.31 : 60.1. FERGUSON, K. V. M. **The clearing of trees from farm lands.** *J. Dep. Agric. Vict.* 43 (4), 1945 (150–2). L.S.

Notes for farmers on methods of felling, ring-barking or poisoning trees in order to clear land for cultivation. It is stressed that full consideration should first be given to the possible defects of clearing and that trees should be left to shelter houses and cattle in the paddocks, and as hedges or shelterbelts for the protection of fields.

24.4. *Shelterbelts. Windbreaks*

[1772]. 24.4 (47.0) : 11.62.11 : 11.48.2 : 23.23.1 : 23.26. GORSHENIN, N. M. [Editor]. Agrolesomelioratsiya. **[Forestry in agricultural improvement.]** Ogiz Gosudarstvennoe Izdatel'stvo Kolkhoznoy i Sovkhoznoy Literaturȳ, Moscow. 1941. pp. 392. [Russ.]

A symposium, based mainly on the work of VNIALMI (The All-Union Research Institute

for Forestry in Agricultural Improvement) in the steppe regions of southern Russia and central Asia.

Part I (pp. 153) deals with shelterbelts, having chapters on (1) their influence on microclimate, snow distribution, soil and agricultural crop yields; (2) choice of species and types of plantation, with sections on the regions concerned and their soils, general requirements of species and mixtures for shelterbelts, silvicultural characters of the chief tree and shrub species, mixtures and spacings, suggested species and types of plantation for each of the 21 regions recognized, and plantations to protect gardens and nurseries; (3) silvicultural technique, covering soil cultivation, measures for retaining snow, planting stock, planting operations and tending; (4) planning.

Part II (pp. 75) is devoted to erosion control, with chapters on (5) general conditions of erosion in the plains, (6) erosion control under the conditions of the plains of European Russia by afforestation and engineering measures; (7) erosion control in mountain areas.

Part III (pp. 52), on the improvement of sands, has chapters on (8) characteristics of sands; (9) the fixation and utilization of sands and sandy soils (the combination of tree plantations, orchards and vineyards is particularly favoured for such sites).

Part IV (pp. 103) contains chapters on (10) forest seed questions; (11) the establishment of nurseries and nursery practice.

A short bibliography accompanies each of the main chapters.

[1773]. 24.4 (47.6) : 23.3. SCHAEFFER, L. Le mouvement forestier à l'étranger. Le boisement de l'Ukraine et la protection des cultures contre le vent. [**Forestry abroad. The afforestation of the Ukraine and the protection of crops against the wind.**] *Rev. Eaux For.* 84 (10), 1946 (607–18). [F.]

An historical review, based mainly on an article by Mayer-Wegelin in *Forstarchiv* [cf. *For. Absir.* 6 (162)].

[1774]. 24.4 (47.9) : 42.21. YUSHKEVICH, N. Lesnŷe polosŷ na subtropicheskikh plantatsiyakh. [**Shelterbelts on subtropical plantations.**] *Sotsial. Zemled.* No. 142 (4242), Oct. 2, 1945 (4). [Russ.] A.P.B.

In subtropical Georgia shelterbelts have been successfully raised for protecting tea and citrus crops, and in Batum and Kobulet districts the trees are 9–10 m. high at 10–12 years of age. The most suitable species for the region are: *Cryptomeria*, *Sequoia* spp., Cypresses, Tulip Tree, Plane and Poplar, all of which reach 20 m. in height at 20 years. The most profitable of all is *Cryptomeria*, which gives excellent protection and yields 250–300 cu.m. of wood per ha. at 20 years.

Contrary to the opinion of some farmers, transplants of *Cryptomeria* and Cypress need not be raised in hot-beds but open sowings may be used provided that the seedlings are carefully tended.

In laying out shelterbelts, attention to local topography and co-operative planning are extremely important, since faultily sited belts may lead to stagnation of cold air on, or its diversion to, some neighbouring plantation, where a frost pocket may form. Hence planning should not be left to the farmer, but should be done by teams of experts for whole districts at a time.

[1775]. 24.4 (68.9). PARDY, A. A. **Windbreaks and shelterbelts.** *Bull. Dep. Agric. S. Rhod.* No. 1346, 1946. pp. 9 + plates. (*Repr.* from *Rhod. agric. J.* 43 (2), 1946 (131–8).)

The advantages and disadvantages of windbreaks are discussed. Types of wind-break and their function are described, and recommendations for planning and planting are made, with special reference to Southern Rhodesian conditions and requirements.

[1776]. 24.4 (73) : 21.0. STOECKELER, J. H. **The Great Plains shelterbelt.** *Amer. Nurserym.* 134 (5), 1946 (7–10). [Lake States Forest Exp. Sta., St. Paul, Minn.]

A review of the history and present state of the Great Plains Shelterbelt Project. [Cf. *For. Abstr.* 7 (No. 1192); 8 (No. 275).]

24.5. *Pruning*

[1777]. 24.5 : 12.25 : 56. HELMERS, A. E. **Effect of pruning on growth of Western White Pine.** *J. For.* 44 (9), 1946 (673–6). [Northern Rocky Mountain Forest and Range Experiment Station, Missoula, Mont.]

Three tests were initiated in 1940, to determine the height to which Western White Pine [*Pinus monticola*] can be pruned without

seriously retarding growth. At the time of pruning the trees were 20–30 years old, 3–10 in. d.b.h. and 20–45 ft. high. All tests were on good to excellent sites. Pruning ranged in severity from 17 to 69 per cent. of the live-crown length. During the first 3 years after pruning, 8 trees died among the 17 from which more than 55 per cent. of the live crown was removed; none of the less heavily pruned trees died. It appears that about 50 per cent. is the safe limit from the standpoint of causing serious mortality. The removal of 20 per cent. of the live crown length caused no appreciable reduction in rate of height growth; the removal of 33 per cent. of the live crown resulted in an average loss in annual growth of only 0·1 ft.; but the removal of 60 per cent. of live crown resulted in a reduction of 36 per cent. in height growth, and only trees of exceptional vigour survived this heavy pruning. Diameter growth fell off more rapidly than height growth as a result of pruning. Removal of 20 per cent. of live crown caused an average reduction in diameter growth of 5 per cent. and removal of 60 per cent. caused an average reduction of 73 per cent. in diameter growth, during the 5-year period following pruning. It is concluded that only about one-third of the live crown can be removed without substantially lowering the rates of growth, both in diameter and in height. [Cf. *For. Abstr.* 5 (33, 180).]

It was observed that, with a given intensity of pruning, the resulting loss in growth rate was greatest in the most open stand and least in the densest stand. The same correlation was observed between rate of mortality after heavy pruning and density of stand. Of trees with over 55 per cent. of live crown removed, none died in the densest stand, 3 out of 5 died in the intermediate stand, and 5 out of 6 in the most open stand. This response is in harmony with the belief that the more heavily shaded lower limbs on trees growing in closed stands contribute less to the nutrition of the trees than the lower limbs on open-grown trees. [Cf. *For. Abstr.* 8 (Nos. 1481, 2156).]

3. FOREST UTILIZATION. FOREST TECHNOLOGY.

[1778]. 3 (485) : 07.2. GREWIN, F.; HÄGGLUND. Svenska Träforsknings institutet. **[The Swedish Wood-Research Institute.]** *Medd. Svenska TräforsknInst.* (*Träkemi och Papperstekn.*) No. 1, 1945. pp. 24. [Sw.] *Repr.* from *Svensk PappTidn.* 47, 1944 (115–38).

[1779]. 3 (73) : 07.2 : 02.5. **Forest products research guide.** American Forest Products Industries, 1319 Eighteenth Street, N.W., Washington 6, D.C. 2nd ed., 1945. pp. 142. P.R.

A comprehensive summary and classification of forest products research already done in the U.S. with suggestions for additional research. Research agencies are listed and sources of published information on forest products utilization are given. A list of technical and reference books is included.

[1780]. 3 (94) : 01.6. HULME, M. I. [Compiler]. **Bibliography on Australian timbers and other forest products.** Division of Forest Products, Council for Scientific and Industrial Research, Yarra Bank Road, South Melbourne. 1944. pp. 66.

[1781]. 3 (94) : 01.6. HULME, M. I. [Compiler]. **Bibliography on Australian timbers and other forest products. Supplement No. 1.** Division of Forest Products, Council for Scientific and Industrial Research, Yarra Bank Road, South Melbourne. 1945. pp. 15.

[1782]. 3 (94) : 07.2. LIGHTFOOT, G. **C.S.I.R.—1945.** Council for Scientific and Industrial Research, Commonwealth of Australia. 1945. pp. 98.

A review, in non-technical terms, of the work of the Australian Council for Scientific and Industrial Research since its foundation.

31. PROPERTIES AND ANATOMY OF WOOD. WOOD RESEARCH

[1783]. 31 : 33.4 : 38.2 : 33.15. NÁJERA Y ANGULO, F. La evolución de la tecnica en el empleo y aplicaciones de la madera de construcción. **[Evolution of technique in the use and application of constructional timber.]** Instituto Forestal de Investigaciones y Experiencias, Madrid. 1944. pp. 132. [Span.e.f.g.]

A general textbook on the structure and properties of wood, and its use as a structural material including the manufacture and industrial applications of glued, compressed, metallized, and Bakelite woods.

31.0. *General Information on Woods*

[1784]. 31.0 (51) : 12.26–8. TANG, Y. **Preliminary manual of the Chinese commercial timbers.** *Tech. Bull. For. Prod. Lab., Kaiting, China* No. 1, 1941. pp. 55. [Chin.] *Abstr.* in *Acta Brevia Sinensia* No. 11, 1945 (11).

This condensed manual deals with 58 genera of common Chinese timbers. Under each genus, an enumeration is given of the scientific and local names, distribution, and importance of the best species. Their general properties and uses are also briefly recorded. There are a full list of the contents in English and a table of the families and genera of the hardwoods recorded in the text (pp. 52–5).

[1785]. 31.0 (51) : 31.2 : 12.25–8. **Table showing physical properties and allowable unit stresses of some important Chinese woods.** *Spec. Bull. For. Prod. Lab., Kaiting, China* No. 43, 1945. p. 1. [Chin.E.]
Data are given for 23 softwoods and 50 hardwoods.

[1786]. 31.0 (59.5) : 33 : 12.26–8. DESCH, H. E. **Manual of Malayan timbers.** Vol. I. *Malay. For. Rec.* No. 15, 1941. pp. vii + 328 + plates.

A revision of Malayan Forest Record No. 1 (Commercial Woods of the Malay Peninsula), enlarged to include any tree (as opposed to a shrub) of which material was available for study. The arrangement is alphabetical by families and the first volume deals with families from Aceraceae to Marcgraviaceae. Information is given under the following heads:—(1) general: size of family, economic products, anatomical structure of the family as a whole, and occurrence in the Malay Peninsula; (2) trade and vernacular names; (3) the timbers: physical and mechanical properties, features visible to the naked eye, working qualities, seasoning, preservation, defects, importance and uses.

[1787]. 31.0 (67.2) : 09.7. HEITZ, H. La forêt du Gabon. **[The forest of Gabon.]** Larose, Paris. 1943. pp. viii + 293. [F.] Price [19*s.* 6*d.*]

Contains descriptive notes on 89 species from the estuary of the R. Gabon, arranged by families; the commercial, scientific, and native names are given for each species.

[1788]. 31.0 (73) : 01.6 : 35. WEISIGER, N. [Compiler]. **Use, properties and identification of American woods.** (Basic information sources.) U.S. Department of Commerce, Washington, D.C. 1945. pp. 14. P.R.

A list of American publications dealing with the uses, properties and identification of American woods, with a list of Trade Associations, Export-import Associations, and the addresses of Department of Commerce Field Offices.

[1789]. 31.0 (73). BETTS, H. S. **Red Pine (*Pinus resinosa*).** U.S. Forest Service: *Amer. Woods.* 1945. pp. 5.

Nine other pamphlets in this series issued during 1945 by the same author are: Jack Pine (*Pinus banksiana*) (pp. 5); Red Alder (*Alnus rubra*) (pp. 5); Pecan (*Carya* spp.) (pp. 9); Hackberry (*Celtis* spp.) (pp. 6); American Holly (*Ilex opaca*) (pp. 4); Osage-orange (*Maclura pomifera*) (pp. 4); American Sycamore (*Platanus occidentalis*) (pp. 5); Black Willow (*Salix nigra*) (pp. 8); American Basswood (*Tilia americana*) (pp. 6). [See also *For. Abstr.* 6 (166) and 8 (No. 281).]

[1790]. 31.0 (82) : 31.2. Coeficientes fisico-mecanicos, caracteristicas y aplicaciones industriales de las principales maderas argentinas y de importacion. **[Physico-mechanical coefficients, characteristics and industrial applications of the principal Argentine and imported timbers.]** *Maderil* 18 (7), 1946 (26–9). [Span.]

[1791]. 31.0 (82) : 34. DEVOTO, F. E., and ROTHKUGEL, M. Aplicaciones de las maderas argentinas y demás productos forestales. **[Uses of Argentine timbers and other forest products.]** *Publ. misc. Minist. Agric. Argentina* No. 186, 1945. pp. 96 + index. [Span.]

Includes lists and tables showing the main uses of Argentine woods (arranged alphabetically under uses and under common names); the native timbers used most by the Argentine Navy; tanstuffs; oil-bearing plants; medicinal plants; plants producing gums, waxes, resins, saponins, dyes, etc.; rubber-bearing plants; edible leaves and fruits of indigenous trees; specific weights of Argentine timbers, calorific power of the principal indigenous and exotic timbers of Argentina; chemical analysis of the fruits, seed and wood of some Argentine species; durability of indigenous, exotic and imported timbers in running water, earth and air; and uses of the wood of the exotic species most commonly planted and of the greatest economic importance in Argentina.

[1792]. 31.0 (88.1) : 33. DANKS, F. S. **Notes on British Guiana timbers.** [Forest Department, British Guiana.] 1945. pp. 28.

[1793]. 31.0 (9) : 09.7. KRAEMER, J. H. **Native woods for construction purposes in the Western Pacific region. (Revised edition covering the Solomon Islands, New Guinea Island, the Bismarck Archipelago, the Molucca Islands, Celebes, and the Philippine Islands.)** Bureau of Yards and Docks, U.S. Department of the Navy. *Navdocks* No. P–101, 1944. pp. v + 382 + figs. + maps.

A brief description is given of each area, its topography, climate and the kind of forest vegetation to be found.

In the whole area dealt with it has been estimated that there are at least 6,000 species of trees, mostly in mixed stands. Some of the most important of these species (about 1 per cent.) have been selected and are described and illustrated in a section which forms the main body of the book. The selection was made on the basis of the distribution of the species, their accessibility and suitability for wartime construction needs.

Strength values for some species are given in an appendix and other appendices contain notes on the durability of various woods, preservative measures, thatching materials and the collection of samples in the field. There is also an index of botanical and local names, with maps of the regions discussed.

[1794]. 31.0 (9) : 09.7. KRAEMER, J. H. **Native woods for construction purposes in the South China Sea region. Burma, Malay Peninsula, Thailand, Sumatra, Java, Borneo, French Indo-China, and Southeast China including Hainan and Formosa.** Bureau of Yards and Docks, U.S. Navy Department. *Navdocks* No. P–163, 1945. pp. iv. + 277 + map.

A selection has been made from the several thousands of tree species to be found in the South China Sea region, according to their distribution, occurrence in areas accessible to Construction Battalions, and the suitability of the wood for wartime construction needs. These species are described and illustrated. Chapters on the collection of samples in the field, the strength properties of wood (with some data on species of this area), the durability of wood and preservative treatment, and thatching materials are included. A list of botanical and local names of trees and a map of the region are also given.

[1795]. 31.0 (923) : 12.19.1. CAVIQUE SANTOS, P. E. Alguns apontamentos sôbre a flora forestal de Timor. [**Some notes on the forest flora of Timor.**] *Agros, Lisboa* 27 (3/6), 1944 (179–83). [Port.]

Includes a 2-page list of the common and botanical names of some useful woody plants either indigenous or cultivated in Timor, and shorter lists of the most abundant timber species, species relatively abundant, rare species, trees of the sea coast, and soft woods suitable for matches, packing boxes, etc.

[1796]. 31.0 : 12.25. **The properties of Australian timbers: Hoop and Bunya Pines.** *For. Prod. News Lett. C.S.I.R. Aust.* No. 141, 1946 (4).

[1797]. 31.0 : 12.25 : 12.19 : 33. ALFONSO, J. L. El pehuen—*Araucaria araucana.* [**The Pehuen—*Araucaria araucana.***] *Mundo maderero* 7 (74), 1946 (18, 20–3). [Span.]

General information on the tree, and on the structure and physical and chemical properties of the wood, which is used for paper pulp and plywood. Large-scale plantations are not advised because of its slow growth compared with exotics.

[1798] 31.0 : 12.25. **Specimen woods No. 131: Podo (*Podocarpus gracilior*).** *Suppl.* to *Wood* 11 (11), 1946 (313–4).

[1799]. 31.0 : 12.25 : 21.9 : 31.41. STUART, S. S. Ciprestes milenares. [**Thousand-year-old Cypresses.**] *Brasil madeireiro* 1 (9), 1945 (23–6). [Port.]

Examples are given of the longevity of *Taxodium* spp. and of the remarkable durability of their timber. 'Perforated wood', due to fungus attack on *Taxodium* spp., is remarkably durable and is much used for projecting beams, garden furniture, block pavements, rustic gates, and even for cupboards, shelves, and radio cabinets.

[1800]. 31.0 : 12.26–8 (82). GIACOBBI, O. S. El quebracho blanco. [***Aspidosperma quebracho-blanco* Schl.**] *Alm. Minist. Agric. Argent.* 20, 1945 (111–4). [Span.] I.I.F.

Brief notes on the distribution and habit of the tree; its wood properties; recommended felling times; charcoal and the derivatives of pyrogenic distillation; and chemical products obtained from bark, fruit and leaves.

[1801]. 31.0 : 12.26–8 : 31.1 : 31.27 : 33.15.1. RUNQUIST, E., and THUNELL, B. Undersökningar över några virkesegenskaper hos björk. [**Research on some wood properties in Birch.**] *Medd. Svenska Träforskn-Inst.* (*Trätekn. Avd.*) No. 7, 1945. pp. 11. [Sw.sw.e.] *Repr.* from *Trävaruindustrien* No. 18, 1945. P.R.

A report on material of *glasbjörk* and *gråbjörk* (two varieties of *Betula pubescens*) and of *vårtbjörk* (*B. verrucosa*) from various Swedish localities.

(i) Measurements of fibre length and breadth in *glasbjörk* and *gråbjörk* showed statistically significant differences between the two varieties, but such differences were so small (about 1 per cent.) as to be negligible in practice. Fibre length (and possibly also breadth) increased with increasing age of tree, approaching a constant value at about 40 years in *glasbjörk* and at about 50 in *gråbjörk*.

(ii) In bending and impact tests of *B. pubescens* (both varieties) and *B. verrucosa*, no strength differences were apparent between these types, though such differences did exist between material from different localities irrespective of taxonomic types.

(iii) Veneer-cutting trials showed that *gråbjörk* gives a considerably higher yield than *glasbjörk* and that *B. verrucosa* is inferior in this respect to either of the *B. pubescens* types. These differences are attributable to differences in straightness of grain and in natural pruning.

[1802]. 31.0 : 12.26–8 (67.2). NORMAND, D. Monographies des bois commerciaux. L'okoumé. [**Monographs on commercial woods. Gaboon (*Aucoumea klaineana*).** *Rev. Bois Appl.* 1 (6), 1946 (16–8). [F.] P.R.

[1803]. 31.0 : 12.26–8. **Specimen woods No. 129: Agboin (*Piptadenia africana*).** *Supp.* to *Wood* 11 (9), 1946 (253–4).

[1804]. 31.0 : 12.26–8 (94). **Properties of Australian timbers: W. A. Blackbutt.** [*Eucalyptus patens* **Benth.**] *For. Prod. News Lett. C.S.I.R. Aust.* No. 144, 1946 (4).

[1805]. 31.0 : 12.26–8. **The properties of Australian timbers: Northern Silky Oak** [*Cardwellia Sublimis*]. *For. Prod. News Lett. C.S.I.R. Aust.* No. 140, 1946 (4).

[1806]. 31.0 : 12.26–8 (81) : 33.8. HORN, E. F. **New uses for Brazilian timbers.** *Trop. Woods* No. 86, 1946 (12–3).

Data on the physical and mechanical properties of *Balfourodendron riedelianum* Engl. (Rutaceae), and *Luehea divaricata* Mart. (Tiliaceae). The former is now being used for aircraft propellers and for shuttles, and the latter for gunstocks for army rifles. In impact-bending tests made by the Instituto de Pesquisas Technologicas of São Paulo, both species showed a very high coefficient of resilience.

31.1. *Structure. Anatomy. Identification*

[1807]. 31.1 (47.0). GAMMERMAN, A. F., NIKITIN, A. A., and NIKOLAEVA, T. L. Opredelitel' drevesin po mikroskopicheskim priznakam, c al'bomom mikrofotografiy. **[Key for the determination of woods by microscopic characters, with an album of microphotographs.]** Izdatel'stvo Akademii Nauk SSSR, Moscow and Leningrad. 1946. pp. 143. [Russ.] P.R.

The aim of this book is to render possible the determination (down to genus, and in some cases, to species) of woods of the indigenous trees and larger shrubs of the U.S.S.R. The chapters are: I—A general introduction to stem structure and descriptive wood anatomy: there are 34 line drawings, some original, and the definitions of terms used include references to microphotographs. II—The technique of preparing specimens for examination under the microscope, with sections on wood in good and in poor preservation, charcoal, and fossil wood. III—Generic descriptions of the woods of 97 genera of dicotyledons and 6 of conifers, in systematic order, followed by a brief bibliography. IV—A tabular conspectus of microscopic generic characters, in systematic order. V—Keys (*a*) to hardwoods, by transverse and longitudinal sections and by transverse sections alone; (*b*) to conifers, both by transverse and longitudinal sections and by longitudinal sections alone. To aid in distinguishing species so far as possible, VI gives a tabular review of the geographical distribution and stature of species in the genera dealt with.

E. E. Uspenski's key, based on the examination of wood elements in macerated specimens, is reprinted as a supplement, and the work concludes with 95 microphotographs of hardwoods (in cross section) and 7 of conifers (in radial section), all original and × 50. There are indexes to the Russian and Latin names of the genera.

[1808]. 31.1 : 01.2. YATSENKO-KHMELEVSKI, A. A. Standartizatsiya terminov razmerov, upotreblyaemykh pri opisanii drevesiny. **[Standardization of terms of size used in describing woods.]** *Trudy Tbilisskogo Botanicheskogo Instituta* 7, 1939 (109–14). [Russ.e.]

The terms of size recommended by the International Association of Wood Anatomists are given in Russian, Georgian, English, French and German.

[1809]. 31.1 : 01.4. NORMAND, D. Les clés pour l'identification des bois et le système des fiches perforées. **[Keys for wood identification, and the perforated card system.]** *Agron. trop.* 1 (3/4), 1946 (162–72). [F.]

[1810]. 31.1 : 01.4. HALL, E. T. **Preserving and surfacing rotted wood and charcoal.** *Tree-Ring Bull.* 12 (4), 1946 (26–7).

The writer describes a procedure which he has found to be very satisfactory in the preservation of rotted wood and charcoal. The specimen is allowed to dry slowly and then coated with a thin solution of alvar and acetone. He also describes methods of preparing specimens for photographing.

[1811]. 31.1 : 01.4. SCANTLING, F. H. **Photography of charcoal.** *Tree-Ring Bull.* 12 (4), 1946 (27–32).

The writer describes an improved method of preparing and photographing charcoal, which is claimed to yield photographs which compare favourably with the best photographs of wood specimens.

[1812]. 31.1 : 01.4 : 33.39. VENKATESWARA RAO, D., and NARAYAN NAMBIYAR, V. P. **Light-scattering in aqueous timber wood extracts.** *Curr. Sci.* 15 (1), 1946 (19–20). L.S.

In aqueous extracts prepared from *Tectona grandis, Eugenia monogynum, Chikrassia tabularis, Cedrela toona* and *Dalbergia latifolia*, the depolarisation factors ρu, ρv and ρh, with the incident light respectively unpolarized and vertically and horizontally polarized, were determined by the usual Cornu method. The appreciable departure of ρh from the normal value of unity shows that all the extracts are colloids. The values of ρu and ρv are unique in each case and can be relied upon for the identification of the respective timbers.

[1813]. 31.1 : 12.25. LEMESLE, R. Les divers aspects de fibres à ponctuations aréolées chez les Apocarpées archaïques et le criterium de la trachéide du type cycadéen. **[The various aspects of fibres with bordered pits in the primitive Apocarpae, and the criterion of tracheids of the cycad type.]** *C.R. Acad. Sci., Paris* 222 (3), 1946 (195–6). D.S.I.R.

[1814]. 31.1 : 12.26–8 : 01.4. PFEIFFER, J. P., and VAROSSIEAU, W. W. **Classification of the structural elements of the secondary wood of dicotyledons, using decimal indices for classification and identification of wood species.** *Repr.* from *Blumea* 5 (3), 1945 (437–89). [Central Institute for Testing Materials, Delft.] X.

The decimal system aims at a grouping which, as far as possible, links up with botanical groupings; it is based on macroscopic features, specific gravity, hardness, colour, gloss and smell. After a brief review of some schemes of classification and identification taken from Dutch, English and French literature the classification proposed by the authors is described with examples of its practical application. It can be used as a loose-card method. It is suggested that a second classification including microscopic characters should also be constructed, and that the decimal indexing of wood characteristics should be standardized internationally.

[1815]. 31.1 : 12.26–8. TANG, Y. **Systematic anatomy of the woods of the Hamamelidaceae.** *Bull. Fan Inst. Biol. Peking* (*n.s.*) [1944?]. *Abstr.* in *Forest Products Laboratory: a brief account of its plan and works with abstracts of some publications* (*September 1939–December 1944*). National Bureau of Industrial Affairs, China. 1945.

The wood structure of 39 species of 19 genera of the Hamamelidaceae is so constant and primitive that it cannot be used for classification, but it partly supports Reinsch's major divisions of the subfamily Hamamelidoideae based upon dehiscence of the anthers. On the whole, a survey of the allied families favours both Hutchinson's delimitation of the scope of the Hamamelidales and Hallier's interpretation of the phylogenetic position of the Hamamelidaceae.

[1816]. 31.1 : 31.8. AUSTRALIA. **Annual report for the year 1945–46: Division of Forest Products, Council for Scientific and Industrial Research.** Forest Products Laboratory, 69–77 Yarra Bank Road, South Melbourne. 1946. pp. 48.

Further investigations have now indicated that any tendency to maceration of a delignified section on treatment with dilute alkali should be attributed to the swelling of the cell wall; and the earlier conception of a non-lignin bonding material soluble in dilute alkali must be rejected. The extension of this work showed that the intercellular adhesion in delignified tissue might well be attributed to mechanical adhesion between the cells since delignified cross sections of wood can be degraded to a composition equivalent to that of Cross and Bevan cellulose and even alpha cellulose, without complete maceration taking place unless mechanical means are employed. The study of slip planes and minute compression failures in wood and isolated fibres in relation to the cell-wall deformations (dislocation marks) of certain textile fibres has been continued. From examinations of (*a*) optical properties, (*b*) susceptibility to chemical attack, (*c*) staining reactions, and (*d*) distribution in the growing tree, it is suggested that these structures represent regions of micellar distortion, which accounts for their observed anisotropy in polarized light, and that the susceptibility to chemical attack is governed by micellar arrangement and can be attributed to (*a*) the greater ease of penetration of the reactive molecules because of the increased intermicellar spaces and (*b*) increased reaction rate because of the locally increased micellar surfaces. It is concluded that slip planes are in the form of a crinkle, while minute compression failures are in the form of a double crinkle or fold in the cell wall.

In young saplings of *Eucalyptus gigantea*, deliberately pulled from the vertical, tension wood was formed in all cases very soon after the tree had been bent; numerous slip planes and minute compression failures were present in the tension-wood areas. Tension-wood fibres appear to be composed of an outer, flat, micellar spiral and a thick, inner, unlignified layer where the micellar alignment is almost parallel to the longitudinal axis (pp. 7–9).

[1817]. 31.1 : 31.8. DADSWELL, H. E., and WARDROP, A. B. **Cell wall deformations in wood fibres.** *Nature, Lond.* 158 (4005), 1946 (174–5). [Division of Forest Products, Council for Scientific and Industrial Research, Melbourne.]

Microscopic examination of certain naturally occurring cell-wall deformations responsible for the lowered impact strength, particularly in the so-called 'brittle heart', of Australian timbers, indicates that the slip plane is a single fold in the cell wall and the minute compression failure a double fold, both of which are morphologically similar to the dislocation marks of textile fibres. The optical properties of these features have been correlated with their staining reactions and susceptibility to acid attack.

31.2. *Physical Properties*

[1818]. 31.2 (51). **Table showing physical properties and allowable unit stresses of some important Chinese woods.** *Spec. Bull. For. Prod. Lab., Kaiting, China* No. 43, 1945. p. 1. [E.Chin.]

[1819]. 31.2 : 12.25–8 (729). WELLWOOD, R. W. **The physical-mechanical properties of certain West Indian timbers. II & III.** *Carib. For.* 7 (3), 1946 (191–252). [E.Span.e.span.f.] [Commonwealth Plywood Co. Ltd., Ste. Thérèse, P.Q., Canada.]

For the first article in this series see *For. Abstr.* 8 (No. 1105). Part II deals with the properties of Motillo (*Sloanea berteriana*), a native species of Puerto Rico. The wood must be seasoned carefully, but is not difficult to machine and takes a good finish. It has no particular merit as a cabinet wood and seems best suited to be a heavy constructional timber. Part III deals with Haitian Pine (*Pinus occidentalis* Swartz), which occurs in Cuba and Haiti in considerable quantities. The wood has excellent strength properties, being comparable with the Southern Pines and with *P. caribaea* grown in Central America, except in stiffness and compression parallel to grain, which have a lower value. Full details are given of tests and results.

[1820]. 31.2 : 12.26–8 (213) : 31.3. NORMAN, D. D., and BESSON, A. Caractéristiques des bois tropicaux. **[Characteristics of tropical woods.]** *Rev. Bois Appl.* 1 (3), 1946 (3–10). [F.] P.R.

A comparison is made of the anatomical, chemical, physical and mechanical characteristics of tropical woods with those from temperate zones. The influence of cambial activity on the wood structure, and the greater homogeneity and distinctive grains of tropical woods are discussed. The average proportion of lignin in tropical woods is greater than in wood from temperate zones (i.e. 25–40 per cent. in tropical and 20–30 per cent. in temperate climates). The pentosan content of tropical woods (12–20 per cent.) places them mid-way between the softwoods (5 to 11 or 12 per cent.) and hardwoods from temperate zones (usually over 20 per cent.). Extractives are also dealt with. A large number of tropical woods have a high silica content [cf. *For. Abstr.* 7 (No. 1816)]. The specific gravity of wood of a given moisture content varies more widely in tropical woods, while, for woods of a density between 0·6 and 0·8, tropical woods give lower values for volumetric shrinkage from the green to the air-dry state. Fibre-saturation point of tropical woods is in general lower. The resistance of tropical woods under static loads is greater but resistance to impact loads is less than in hardwoods from temperate zones.

[1821]. 31.2 : 12.29 (51) : 34.28. LIANG, H., and CHOW, K. Y. **Physical and mechanical properties of Bamboo.** *J. For. Ass. China* 3 (1), 1944 (98–119). [Chin.e.]

Data are given of the physical and mechanical properties of the three most important bamboos in Szechwan Province, *Phyllostachys edulis*, *Sinocalamus affinis* and *Bambusa nana*.

31.22. Relation to Water, Air, Gases

[1822]. 31.22.1. ANDERSON, A. B. **Rapid method for determining moisture content of lumber.** *Res. Lab. Note West. Pine Ass.* No. 19, 1942. pp. 4. P.R.

In the 'Bidwell-Sterling' method a known

weight of wood chips or sawdust is boiled in a flask containing toluene solution. The flask is connected to a return trap and condenser. The water in the wood vaporizes with the heated toluene, is condensed and falls into a graduated trap, where, being heavier than the toluene, it settles at the bottom. Procedure and apparatus are described and illustrated.

[1823]. 31.22.1 (51). Tu, H. Y. **Equilibrium moisture content of some commercial timbers at Kaiting or Loshan, Sze.** *Spec. Bull. For. Prod. Lab., Kaiting, China* No. 33, 1942 (1–6 + charts). [Chin.] *Abstr.* in *Forest Products Laboratory: a brief account of its plan and works with abstracts of some publications (September 1939–December 1944).* National Bureau of Industrial Affairs, China. 1945.

The average equilibrium moisture content of 4 species was 17·9 per cent., *Cupressus funebris* being the highest (19·7 per cent.), *Schima crenata* the lowest (15·0 per cent.).

[1824]. 31.21.1 : 31.22.2. Kollmann, F. **Sorption and swelling of wood.** *Naturwissenschaften* 32, 1945 (121–38). Chem. Abstr. 40, 1946 (2297). P.R.

Chemisorption of H_2O by wood is attributed to reactive OH groups of the cellulose chain; this type of sorption may contribute to increased strength of the wood and accounts for up to about 8 per cent. of the H_2O content. Additional H_2O is held by adsorption on interior surfaces and finally by condensation in capillaries. The relations between the amount of H_2O held and its vapour pressure at different temperatures are discussed. The H_2O content of wood in equilibrium with an atmosphere saturated with H_2O vapour varies from 24 to 35 per cent. The difference is due to filling of capillaries with rosin and similar materials. Sorption hysteresis, sorption energy, and swelling pressure are discussed, as well as the effect of different salt solutions on the swelling and means for the prevention of swelling. Many references.

31.27. Mechanical Strength

[1825]. 31.27. [Weinbraum, O.] A influência do tempo do modulo da elasticidade de madeiras. **[The influence of the time factor on the modulus of elasticity of timbers.]** *Brasil madeireiro* 1 (10), 1945 (30). [Port.] [Academia Brasileira de Ciências.]

Results of experiments on the influence of the time factor on the modulus of elasticity of timbers indicate that wood deformations (initial flexion and subsequent deviations) are different before and after loading, and that flexion continues to increase even after 7 days of constant load. The relation between the deviation formed after 7 days and the initial flexion is 1 : 5 (at a load of 600 kg. per sq. cm.), so that the modulus of elasticity shows a 20 per cent. variation, decreasing with the duration of the load. Hence, the value of the modulus of elasticity should always be accompanied by the time during which the load was applied. The greater the load, the shorter the time taken for the wood to acquire a permanent bend.

[1826]. 31.27 : 01.7 : 38.2. Ruffner, B. F. **The use of Fourier series in the solution of beam-column problems.** *Bull. Ore. Engng. Exp. Sta.* No. 21, 1945. pp. 61.

In this bulletin are presented methods for the solution of beam-column problems by use of the trigonometric series:

$$y = a_1 \sin \frac{\pi x}{l} + a_2 \sin \frac{2\pi x}{l} + a_3 \sin \frac{3\pi x}{l} \ldots a_m \sin \frac{m\pi x}{l}$$

for representing the equation of the elastic curve. The coefficients $a_1, a_2, \ldots a_m$ are constants in any particular problem. Two methods for the determination of these coefficients are given for problems involving beam-columns of constant EI, where E is the modulus of elasticity and I the moment of inertia. For the solution of problems of beam-columns with varying EI a method of successive approximations is given. Tabulated values of deflection, slope, and moment functions are given for beam-columns loaded with end couples. Use of these in the solution of beam-column problems with statically indeterminate reactions is discussed. Emphasis in the bulletin is on application of the methods rather than on development of rigorous theorems on series convergence, etc. [Cf. *For. Abstr.* 7 (No. 7).] *From author's summary.*

[1827]. 31.27 : 31.8 : 12.25 : 31.22.1 : 33.4. Thunell, B. Beräkning av tryckta strävor av furuvirke med hänsyn till virkets kvalitet. **[Effect of timber quality on permissible stresses in Scots Pine posts and struts in compression.]** *Medd. ProvnAnst., Stockh.* No. 90, 1944. pp. 26. [Sw.e.] *Repr.* from *Tekn. Tidskr.* No. 21, 1944. L.S.

An account of tests on sawn Scots Pine (Swedish) of commercial sizes in axial compression. Values for average and minimum ultimate compression strength, and average and minimum compression stress at which noteworthy lateral buckling or a noteworthy influence of time of loading occurs, are tabulated for different slenderness ratios to show their dependence on the 'knot ratio sum' k_3 and moisture content. The knot ratio [cf. following abstract] is here defined as the ratio of equivalent knot diameter to width of face containing the knot, and k_3 as the maximum sum of the knot ratios on a length equal to thrice the smallest side of the timber.

[1828]. 31.27 : 31.8 : 12.25 : 33.4. THUNELL, B. Kvalitet och hållfasthet hos virke. **[Quality and strength in building timber.]** *Medd. ProvnAnst., Stockh.* No. 89, 1942. pp. 17. [Sw.sw.g.] *Repr.* from *Tekn. Tidskr., Väg- och vattenbyggn-konst samt husbyggnadsteknik* No. 26, 1942. L.S.

Brief notes on defects in general are followed by a discussion of knots as the most important class, apart from sloping grain, affecting strength. Knot size may be expressed as a 'knot ratio' (= knot diameter/width of face in which the knot occurs). If certain assumptions are made, for simplification, about the shape of the knots, it is possible to calculate theoretically the effect of this ratio on strength. Curves constructed by this method to show the theoretical effect of the knot ratio on bending strength in Swedish Pine, agree in form with results from practical tests. Available test results, however, are as yet too few to indicate whether these curves can be regarded as of general validity for Swedish Pine timber. [Cf. *For. Abstr.* 7 (No. 781).]

[1829]. 31.27 : 33.4 : 38.2. ERICKSON, E. C. O. **Rigidity and strength of wall frames braced with metal strapping.** *Rep. U.S. For. Prod. Lab., Madison,* No. *R*1603. 1946. pp. 7 + tbl. + figs. P.R.

A report on racking tests made to study the behaviour of horizontally sheathed wall panels braced with metal strapping instead of let-in and other types of bracing. Tests results are given and indicate that metal strapping placed diagonally increases resistance to racking above the limit afforded by well-nailed horizontal sheathing alone.

[1830]. 31.27 : 38.2. CAMPREDON, J. Résultats d'essais sur divers types d'assemblages de charpente en bois. **[Results of tests on various types of wooden framework constructions.]** *Circ. Inst. tech. Bâtim. Trav. publ., Paris* No. H6, 1942. pp. 19. [F.] P.R.

See *For. Abstr.* 8 (No. 299).

31.3. *Chemical Properties*

[1831]. 31.3. WACEK, A. VON. Der chemische Aufbau des Holzes. **[The chemical constituents of wood.]** *Experientia* 2 (Fasc. 5), 1946 (171–80). [G.e.] D.S.I.R.

The constitution of the different wood substances is discussed. The total amount of the polysaccharides, or holocellulose, can be obtained if the separation is effected carefully. Holocellulose consists of submicroscopic crystalline cellulose and wood polyoses which differ also from cellulose by their degree of polymerization. Less progress has been made in the elucidation of the lignin structure but the author has tried to give an exact definition of the different constituents which corresponds to present developments in lignin chemistry.

[1832]. 31.3 : 12.11.23. BERTRAND, G., and SILBERSTEIN, L. Variation de l'acide acétique du bois avec l'âge. **[Variations in the acetic acid content of wood according to age.]** *C. R. Acad. Sci., Paris* 222 (15), 1946 (833–5). [F.] D.S.I.R.

Wood of *Picca abies, Pinus pinaster, Fagus sylvatica* and *Quercus sessiliflora* was analysed for acetic acid content, in order to find any variation which might exist in wood of different ages. Analyses were made of wood from twigs of 1 to 5 years, from small and large branches, and from the top, middle and base of the trunk. The results are set out in the report.

[1833]. 31.3 : 12.25. JAYME, G., and FINCK. **The polysaccharide portion of Sprucewood.** *Cellulosechemie* 22, 1944(102–14). Chem. Abstr. 40, 1946 (2977–8). P.R.

[1834]. 31.3 : 12.25. ERDTMAN, H. Die phenolischen Inhaltsstoffe des Kiefernkernholzes. V. Das Kernholz von *Pinus strobus.* **[The phenolic constituents of Pine heartwood. V. The heartwood of *P. strobus.*]** *Svensk kem. Tidskr.* 56 (1), 1944 (2–14). [G.] VI. Das Kernholz von *Pinus cembra* L. **[VI. The heartwood of *P. cembra.*]** *Svensk kem.*

Tidskr. 56 (2), 1944 (26–31). [G.] VII. Das Kernholz von *Pinus nigra* Arn., *Pinus montana* Mill., *Pinus banksiana* Lamb., und *Pinus palustris* Mill. [**VII. The heartwood of *P. nigra, P. montana, P. banksiana* and *P. palustris*.**] *Svensk kem. Tidskr.* 56 (3), 1944 (95–101). [G.] U.V.-Absorption und sterischer Bau des Pinosylvins. (VIII. Mitt. über die phenolischen Inhaltsstoffe des Kiefernkernholzes). [**Ultra-violet absorption and stereochemical structure of pinosylvin. (Eighth report on the phenolic constituents of Pine heartwood.**)] *Svensk kem. Tidskr.* 56 (4), 1944 (134–42). [G.g.] [Institut för Cellulosateknik och Träkemi, K. Tekniska Högskola, Stockholm.] L.S.

Cf. *For. Abstr.* 5 (258) and 8 (No. 304). The series of analyses described in V–VII was undertaken to determine how far pinosylvin and related phenolic compounds might be characteristic of heartwood of *Pinus* as a genus.

V reports the following, in per cent. of initial wood, for heartwood of *P. strobus*:—a 'membrane substance' (0·08), pinite (0·3), pinosylvin monomethyl ether (0·5), chrysin (0·1), tectochrysin (0·1), and the new substances, for which structural formulae are suggested, pinostrobin (0·004) and its laevorotatory isomer strobopinin (0·07) of m.ps. 90–91° and 225–227° C. respectively, and in one case only, pinobanksin (a very small quantity) of m.p. 171–173°.

VI: Heartwood of *P. cembra* yielded:—a 'membrane substance' (0·1), pinite (0·5), pinosylvin monomethyl ether (0·5), chrysin (0·03), tectochrysin (trace), and a compound here named pinocembrin (0·03) and identified as *l*-dihydrochrysin, of m.p. 197–198°. The main constituents thus resembled those of *P. strobus*.

VII [Quantitative data are omitted owing to the small amounts of material investigated]: (*a*) The acetone extract of *P. nigra* yielded a 'membrane substance', pinosylvin and its monomethyl ether, and from the neutral fraction of the acetone, but not of the ether extract, a very small quantity of pinosylvin dimethyl ether was isolated. (*b*) *P. montana* heartwood contained a 'membrane substance', pinosylvin monomethyl ether and pinocembrin, isolated from the acetone extract. (*c*) *P. banksiana* (ether extraction with subsequent alcohol extraction): besides an ether-insoluble 'membrane substance' and uncrystallizable fatty substances, the alcohol extract yielded pinocembrin and a weakly dextro-rotatory substance of m.p. 172–174°, here named pinobanksin, doubtless identical with that obtained from *P. strobus*. From an acid fraction of an ether extract, pinosylvin monomethyl ether was isolated. A monomethyl ether (m.p. 91–92°) prepared from the pinocembrin was clearly identical structurally with pinostrobin from *P. strobus*. (*d*) *P. palustris*: The neutral fraction of the acetone extract contained a very small quantity of pinosylvin dimethyl ether: the acid fraction yielded a substance (m.p. 173–175°) giving the same colour reaction as pinobanksin and causing no depression of m.p. with the latter, but the amount isolated was too small for analysis. An uncrystallizable phenolic fraction, after methylation and bromation, gave a small quantity of dibrom-pinosylvin-dimethyl-ether-dibromide.

VIII reports on measurements of the U.V. absorption spectra of stilbene and some derivatives in absolute alcohol. *Trans*-stilbene had an absorption spectrum agreeing closely on the whole with that reported by Smakula and Wassermann. Comparisons of spectra of pinosylvin (3, 5-dioxystilbene) and its mono- and dimethyl ethers, as well as those of 3,4-dimethoxystilbene and 3,4-methylene-dioxystilbene, showed that all belong to the *trans* series. Values of λ and log ϵ are tabulated.

[1835]. 31.3 : 12.25. AUSTRALIA. **Annual report for the year 1945–46: Division of Forest Products, Council for Scientific and Industrial Research.** Forest Products Laboratory, 69–77 Yarra Bank, South Melbourne. 1946. pp. 48.

Work on the extraction of lignin with methanol has been extended to *Pinus radiata*. The results are substantially the same as for *Eucalyptus regnans* [cf. *For. Abstr.* 7 (No. 1815)] in that only part of the lignin was removed and there was accompanying degradation of the carbohydrates. The yield of isolated lignin and the extent of breakdown of carbohydrates were, however, less and the loss of xylan greater, for the softwood than for the hardwood (pp. 11–12).

[1836]. 31.3 : 12.26–8 : 33.32.1 : 34.26. JAYME, G., and ROTHAMEL, L. **Composition of the extractives obtained from Black Poplar wood and of those found in the resulting sulphite and sulphate pulps.** *Cellulosechemie* 22, 1944 (88–96). Chem. Abstr. 40, 1946 (2980). P.R.

[1837]. 31.3 : 33.32.1. VIRTANEN, A. I., and KOISTINEN, O. A. **Fermentation of the native cellulose and pentosans in wood.** *Svensk kem. Tidskr.* 56 (12), 1944 (391–400). [E.] I. S.

Sulphite pulps of Spruce sawdust were fermented by cultures of thermophilic cellulose bacteria, and the fermentation products were determined. When the lignin content was as high as 26·6 per cent., about 35 per cent. of the cellulose was fermented; with a lignin content of 20 per cent., 80 per cent. of the cellulose was fermented. Fermentation of cellulose prepared with nitric acid took place at a lower rate than with the sulphite pulps. Cellulose with a lignin content of 11·4 per cent. was fermented in 16 days by only 57 per cent. It is concluded that the lignin content alone does not determine the fermentation rate of the cellulose. Fermentations made of Birch wood flour, which had been separated into fractions according to its fineness, showed clearly that the finer the flour, the more complete was the fermentation of the cellulose. Experiments were also carried out with Aspen wood flour, both cellulose and pentosans being determined before and after fermentation. A great similarity was noted between the products of the wood fermentation and those of the cellulose fermentation, but certain differences in wood were due to the fermentation of the pentosans. Further experiments to determine the effect of the wood-flour content of the nutrient solution on the extent of cellulose fermentation showed that the greatest degree of fermentation was obtained with a 2-per-cent. solution. It is concluded that the results do not support the theory that cellulose and lignin are chemically bound to each other in wood, although they do not disprove it.

[1838]. 31.3 : 34.6 : 33.3. FREUDENBERG, K., LAUTSCH, W., and PIAZOLO, G. **The nitration of Spruce lignin. The aromatic nature of lignin in wood.** *Cellulosechemie* 21, 1943 (95–6). Chem. Abstr. 38 (18), 1944 (5081). P.R.

[1839]. 31.3 : 34.6 : 33.3. FREUDENBERG, K. **The aromatic nature of lignin in wood.** *Cellulosechemie* 22, 1944 (117). *Chem. Abstr.* 40 (11), 1946 (3259). P.R.

The aromatic nature of isolated Spruce lignin is undisputed. Lange has shown, by means of the absorption spectrum of Spruce wood, that lignin *in situ* has approximately 1 aromatic ring per 10 C atoms. Lignin in Beech wood also occurs in various degrees of polymerization. Aqueous extracts from Beech wood, prepared according to Schutz (see *For. Abstr.* 6 (3), 168), show ultraviolet absorption spectra which indicate the presence of aromatic compounds. On fractionation with Pb $(OAc)_2$ or with acetone, they are separated into portions rich in lignin and low in sugars. The C balance of Beech wood also shows that lignin is present in it as an aromatic compound.

[1840]. 31.3 : 34.6 : 33.3. SCHÜTZ, F., and SARTEN, P. **Wood chemistry. II.** *Cellulosechemie* 22, 1944 (1–15). Chem. Abstr. 38 (19), 1944 (5398). P.R.

From a critical review of the literature (49 references) the authors conclude that the aromatic nature of lignin is not yet proved and that there exists no lignin in wood which is identical with isolated lignin.

[1841]. 31.3 : 34.6 : 33.3. SCHÜTZ, F., and SARTEN, P. **Wood chemistry. II (appendix). The optical properties of wood and lignin.** *Cellulosechemie* 22, 1944 (114–6). Chem. Abstr. 40 (11), 1946 (3259). P.R.

The *n*s of lignin and of the primary and secondary cell walls lie too close together to permit any conclusions to be drawn as to the aromatic structure of lignin *in situ*. The *n* of 1·61 for lignin, therefore, cannot be taken as a proof that lignin is already preformed in wood. If such were the case, it would be possible to obtain an insoluble lignin by extraction of the wood with Schweitzer's reagent without a prehydrolysis. The authors again conclude that lignin is a secondary reaction product, formed during the isolation process. [Cf. *For. Abstr.* 6 (168).]

[1842]. 31.3 : 34.6 : 33.3 : 12.25. OGAIT, A. **The decomposition of Spruce wood with chloral hydrate and a chloral compound of lignin.** *Cellulosechemie* 22, 1944 (15–9). Chem. Abstr. 38 (19), 1944 (5398). P.R.

When air-dried Spruce-wood meal (10 grams absolutely dry) is heated with 100 grams chloral hydrate containing 2·5 per cent. HCl at 55° for 0·5 hours, 22·4 per cent. of the lignin goes into solution. The residual lignin can be obtained by repeating the extraction. The chloral lignin (I) is isolated in a yield of 27–31 per cent. The elementary composition of (I) is: C 50–52, H 4·7–5·7, MeO 9–11 and Cl 13·6–19·3

per cent. (I) is separated by extraction with $CHCl_3$ into a $CHCl_3$-soluble fraction (II). (II) is isolated and is found to contain C 54·5–55·2, H 5–5·5, Cl 13·3–15·8 and MeO 11·6–12·8 per cent. From the Cl content it is calculated that (II) contains one CCl_3CHO group per 3 lignin-building atoms. Calculated on the CCl_3CHO-free basis, the lignin contains C 65, H 6·5 and MeO 15·5 per cent. (I) is thermoplastic (150°–160°). From this and the mild reaction conditions used, it is concluded that (I) has a low degree of condensation and that it has not undergone drastic changes as compared with the original lignin in wood. Bromal hydrate reacts in a similar way.

[1843]. 31.3 : 34.6 : 33.32.1 : 12.25. LAUTSCH, W., and PIAZOLO, G. **Lignin. LVIII. The composition of the lignin portions of Spruce sulphite waste liquors.** *Cellulosechemie* 22, 1944 (48–54). Chem. Abstr. 39 (11), 1945 (2403). P.R.

The lignosulphonic acid fractions from 2 different sulphite cooks were studied, one from a soft commercial cook and the other from a medium-hard laboratory cook.

In either case the lignin components were precipitated in 9 successive fractions by means of benzacridine. In both series the first precipitates yielded fractions lower in S and the final precipitates fractions higher in S. Extensive analytical data for C, H, N, MeO and S are given. The first precipitates contained approximately 1 S atom per 20 C atoms. The final precipitates contained 1 S per 10 C atoms. The ratio of S to MeO was 1 : 2 in the first and 1 : 1 in the final fractions. Evidently a uniform distribution exists between MeO and C in Spruce lignin. In order to dissolve lignin from Spruce wood at least one SO_3 H group per 20 C atoms is required. The percentage of C in a S-free lignin fraction depends upon how the elimination of S is calculated. Lautsch and Piazolo find that the most satisfactory assumption is that half of the S is eliminated as H_2SO_3 and half as SO_2, and on this basis S-free lignin contains about 65–66 per cent. C. Inasmuch as individual lignosulphonic acid fractions (when computed to lignin) show no significant difference, attempts to separate α- and β-lignin were omitted. The sulphite waste liquors contained no lignin-carbohydrate complexes. Analyses involving MeO balances showed that about 10 per cent. of the MeO originally present in the wood is not a component of the lignin. Basic fractions of coal tar were used as precipitants for lignosulphonic acid; the fraction boiling at 415–435°, which contains the benzacridines, precipitates lignin quantitatively. This is recommended as a quantitative technical separation. Lignin fractions when oxidized with $PhNO_2$ gave varying vanillin yields. The fractions lowest in S gave the lowest vanillin yields (13·8–16·5 per cent. calculated to S-free lignin). Those highest in S gave the highest vanillin yields (26·7 per cent.). The low average yield of 17 per cent. lignin is due to the fact that the lignosulphonates low in S predominate in amount.

[1844]. 31.3 : 34.6 : 33.32.1 : 12.25. FREUDENBERG, K., LAUTSCH, W., and PIAZOLO, G. **Lignin. LIX. The action of sulphite on Spruce wood at 70°.** *Cellulosechemie* 22, 1944 (97–102). Chem. Abstr. 40 (11), 1946 (3258–9). P.R..

Spruce wood (1 kg.) is cooked with 5·5 l. $NaHSO_3$ solution containing 1·45 per cent. NaOH and 11 per cent. total SO_2 at 70° for 12 hours, the cooking liquor is drained off, and the residual wood washed and cooked in the same way with fresh liquor for another 12 hours. After this, the wood is cooked twice for 24 hours, then for 36, 48, 72 and 75 hours, giving 8 fractions of sulphite waste liquor. The 8 waste liquors are separately concentrated and the lignosulphonic acids are precipitated and liberated. They are then analysed for C, H, S, and MeO. The phenolic OH content does not increase with increasing sulphonation. This and other results of the analysis show that in the sulphonation of lignin at 70° no benzofuran rings are split, but that ether linkages, as they occur in pinoresinol, are split without formation of new phenolic OH groups.

31.4. *Durability. Decomposition*

[1845]. 31.4 (51). TANG, Y. **The relative durability of some Chinese timbers at Kaiting or Loshan.** *Spec. Bull. For. Prod. Lab., Kaiting, China* No. 34, 1943 (7–13). [Chin.] *Abstr.* in *Forest Products Laboratory: a brief account of its plan and works with abstracts of some publications* (*September* 1939–*December* 1944). National Bureau of Industrial Research, China. 1945.

Tests were made on 8 species of timber, and

the results show that *Cupressus funebris, Cunninghamia sinensis* and *Phoebe yaoana* are the most durable.

31.42. Attack by Plant Organisms

[1846]. 31.42.1 : 01.6. **List of publications relating to fungus defects in forest products and to decay in trees.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*508 (revised), 1946. pp. 24. P.R.

A revised list, see *For. Abstr.* 1, 1939 (175).

[1847]. 31.42.11 : 33.36.1. **Timber decay and its control.** *Leafl. For. Prod. Res. Lab., P. Risborough* No. 39, 1946. pp. 12.

A description is given of wood fungi and the conditions influencing their growth. The main types of decay, methods of distinguishing them, their effect on the wood, and preventive principles are also dealt with. More detail will be found in a monograph 'Decay of timber and its prevention' which will be published by H.M. Stationery Office shortly.

[1848]. 31.42.11 : 33.36.1 FINDLAY, W. P. K. **Dry rot in buildings and its prevention.** *J. R. sanit. Inst.* 65 (2), 1945 (85–90). O.R.S.

[1849]. 31.42.12 : 32.82 : 31.42.11 : 32.92–4 : 12.25 : 32.25.5. BJÖRKMAN, E. Om uppkomsten av stockblånad och lagringsröta i furusågtimmer i samband med flottning. **[On the development of blue-stain and storage rot in Pine sawlogs during floating.]** *Medd. SkogsforsknInst.* [*SkogsförsöksAnst.*] *Stockh.* 35 (5), 1946. pp. 56. [Sw.e.]

A study to determine the influence of various factors on time of occurrence and extent of degrade and its effect on the value of the yield of sawn timber from the logs.

Degree of barking was the most important single factor. Complete barking (widely practised in Norrland to improve the buoyancy of the younger timber with a greater sapwood percentage that is now being increasingly exploited) gave the most serious damage, owing to checking and consequently deeper penetration of stain and rot fungi. Unbarked timber showed the least degrade, owing to maintenance of a high moisture content. Barking in patches appears promising as a means of combining increased buoyancy with low incidence of degrade: patch-barked logs still had good buoyancy in early November (when unbarked logs were in imminent danger of sinking), and blue-stain or storage rot seldom went deep enough to affect the value of the saw yield appreciably. Further work is needed to determine the best size and number of barked patches per log.

Time out of the water was also very important. Stain and storage rot were increased, very considerably in completely barked logs (owing mainly to drying and checking) and to a much smaller extent in patch-barked and unbarked logs (owing, presumably, to insect attack in the main), by delay in getting logs into the water and by the exposure of stranded logs or those in jams.

Water conditions: Logs in a rapid current, and thus continually washed over, showed very little degrade, whereas those in calm water, if completely barked, were seriously and progressively injured, especially in the portions above the water-line, where almost as much drying-out may occur as in logs stored on land. No certain difference could be demonstrated between storage injuries in fresh and in salt water, though possibly decay was more severe in the former.

Time of occurrence of degrade: Checking occurred very early, generally before the logs were got into the water, in completely barked logs. In patch-barked and unbarked logs very little checking took place. Blue-stain developed early (June) in completely barked material but became serious only in August, or in July if there was delay in getting logs into the water. In patch-barked and unbarked logs, stain was usually slight with normal floating, even if insect attack had been relatively heavy, and even in stranded or jammed logs damage was scarcely of economic importance before August at the earliest. If logs are got into the water by about June 1, storage rot should be practically eliminated at this stage, and even if delay occurs, this type of degrade should be of little economic importance provided that the logs remain in the water. Completely barked logs with serious checking, however, generally show storage rot in August and this may cause considerable economic loss by September or October.

Practical recommendations for preventing degrade are that: (i) If logs must be floated completely barked for the sake of buoyancy, floating should be rapid enough for logs to arrive at the mills by August 1, and on arrival they should be sawn immediately, protected by

water spray, or stored completely immersed in water. (ii) Patch-barking may be practised with advantage where logs can be in the water by June 1 and remain there for the whole floating season, and even land storage up to 1 month during the season entails only limited damage. (iii) Where buoyancy will be sufficient, logs should always be floated unbarked as this constitutes the best protection against storage injuries in general.

The commonest blue-stain fungi were *Cladosporium herbarum*, *Pullularia pullulans* and *Phialophora fastigiata*, and the commonest (usually the only) storage-rot fungus was *Stereum sanguinolentum*.

[1850]. 31.42.12 : 33.92 : 33.36.1 : 33.36.3 : 12.25. BJÖRKMAN, E. Om betingelserna för uppkomsten av brädgårdsblånad samt dennas bekämpande. [**On the conditions for the occurrence of timber-yard blue-stain and methods for its control.**] *Medd. SkogsforsknInst.* [*SkogsförsöksAnst.*] *Stockh.* 35 (7), 1946. pp. 46. [Sw.e.]

Blue-stain control in the Swedish sawmilling industry has been much improved by expensive methods of chemical treatment or, more generally, kiln drying. The aim of the present studies was to explore the possibilities of increased protection by comparatively simple measures and to assess the efficiency of the methods already in use.

Tests showed that spores and conidia were practically ubiquitous in a timber yard during summer, hence, though it is important to minimize sources of inoculum by destroying waste wood and impregnating stack foundations, roofs, stickers etc., successful control demands conditions unfavourable to the development of the fungi. In mid-May, only inconsiderable numbers of spores and conidia were present in the air.

In sapwood of Pine and Spruce exposed to infection under controlled atmospheric humidities of 90 and 100 per cent., no blue-stain occurred where the wood could be brought rapidly to a moisture (based on dry weight) of about 24 per cent. or less, and at the lower humidity considerably less stain developed. Oven-dry wood was slow to regain moisture, thus timber of 18–22 per cent. moisture content and not directly exposed to wetting should run no serious risk of infection even in saturated air. Undried wood, on the other hand, developed stain even at 90 per cent. relative humidity. Conditions are most favourable to the fungi between the end of July and that of September, and least so in winter and spring.

To secure optimum ventilation in air-drying yards, stacks should be long, low and narrow, built on high foundations, end-on to the prevailing wind, in as open a position as possible and preferably on sloping ground. Spacing of the boards and size of stickers are also important, and thin stickers were proved to encourage blue-stain. Kiln-dried stock should be cooled gradually before bulk stacking; if piled hot, it is liable to stain.

Tests of dip treatments of unseasoned boards with the chlorophenol preparations Dowicide and Pentolat, which were roughly equally effective, showed that though as a rule lower concentrations might be used in June–July than in August–October, it is not safe to make this a general assumption. On the other hand, especially if the logs have not been floated, it should be possible in favourable conditions to store winter- and spring-sawn stock untreated or treated at a lower concentration (say 0·8 per cent. for protection till the end of June, as compared with 1–1·2 per cent. for timber stored in summer and autumn). Small-scale preliminary trials were also made with Santobrite and Fibrosan, of which the former was about equal to Pentolat, whereas the latter often encouraged growth of 'mould blue-stain' (most commonly due to *Trichoderma lignorum*).

In experiments on drying, it proved impossible to correlate blue-stain frequency in unseasoned boards with weekly average temperatures and humidities. For such material, chance storms and sources of inoculum may well be the decisive factors. Floated timber is usually heavily infected, and stain readily appears as soon as conditions are favourable, even in spring; here no season offers immunity and the more valuable timber should be kiln-dried or chemically treated.

'Full drying' (kiln; 56 hours) gave adequate protection: 'half-drying' (kiln; 28 hours) was also satisfactory when properly performed and if good conditions were provided for the subsequent air-drying. In July–September, however, it would seem prudent to use 'full drying' or dip treatments.

The development of blue-stain is largely dependent on chance atmospheric variations and it is impossible to lay down general rules. The most important result as regards yard

practice is the demonstration of the necessity of protecting stacks of 'fully dried' and even chemically treated stock from direct wetting by rain or snow, a point which is still neglected in some yards. [Cf. *For. Abstr.* 8 (No. 331) and previous abstract].

31.43. Attack by Animal Organisms

[1851]. 31.43 : 13.2. SCHWARZ, L., and REUSCH, A. Darstellung und Raumgrösse von Hausbockkäferlarvenfrassgängen. [**The representation and volume of the larval tunnels of *Hylotrupes bajulus*.**] *Anz. Schädlingsk.* 16 (11), 1940 (121–4). [G.] [Hygienisches Institut der Hansestadt Hamburg.]

The volume and shape of tunnels of *Hylotrupes bajulus* can be found by means of plastic casts. The destruction of wood per larva varied between 15 and 70 cu.mm. daily according to the temperature and the size of the larva. A larva with an average weight of 70·6 mg. destroyed, at room temperature, 15·3 cu.mm. of wood (7·68 mg.) daily, of which 4 mg. were absorbed as food, while a larva weighing 134·8 mg., subjected to a temperature of 28° C. for about a year, followed by room temperature for about a year, destroyed an average of 24·75 cu.mm. (12·37 mg.) daily, of which 3·1 mg. were absorbed as food.

[1852]. 31.43 : 12.29 : 33.36.3. WHITE, D. G., COBIN, M., and ROBLES, P. S. **The relation between curing and durability of *Bambusa tuldoides*.** *Carib. For.* 7 (3), 1946 (253–73). [E.Span.e.span.f.]

Cut culms of *Bambusa tuldoides* subjected to a variety of treatments were exposed to infestation by *Dinoderus minutus*. Culms cut at 6 months of age had significantly fewer holes than those cut at 12 to 42 months; culms cut at 36 to 42 months had also significantly fewer holes than those cut at 12 to 30 months. The number of beetle holes which appeared at the end of 1 month's exposure was indicative of the future total infestation. The most satisfactory and least troublesome treatment was clump-curing, which consists in leaning cut culms for 28 days upright against living culms, without removing the leaves. In wet weather the butt ends were set on a floor of waste bamboo pegged horizontally on the ground. The object was to accelerate drying, and starch depletion was not considered. Submergence in water for 130–192 days was equally effective, but caused serious staining of the Bamboo. The data show that even the most effective treatment resulted in 66·7 per cent. beetle infestation. Splitting of internodes occurred in many of the culms which had been submerged. Clump-cured culms showed no signs of splitting.

[1853]. 31.43 : 13.2. BECKER, W. B., and SWEETMAN, H. L. **Leaf-feeding sawfly larvae burrowing in structural wood.** *J. econ. Ent.* 39 (3), 1946 (408).

Mature sawfly larvae, possibly of *Macremphytus tarsatus* (Say), burrow in wooden structures in Massachusetts, forming shallow pits or deep holes mostly in decayed wood.

31.44. Injury by Chemicals

[1854]. 31.44 : 12.25 : 33.8. **Redwood tanks for chemical solutions.** California Redwood Association, 405 Montgomery Street, San Francisco, California. 1946. pp. [103]. P.R.

A series of reports on the service records of Redwood tanks used in the United States for chemical solutions. Data are given on the storage of 63 chemical solutions, and include type of industry where the tanks are used, number and size of tanks, thickness of stock, years of service, and condition at the time of inspection, with remarks on any chemical activity which has taken place.

[1855]. 31.44 : 33.8. POETTER, H. Holz als Werkstoff im chemischen Apparatebau. [**Wood as a material for chemical apparatus.**] *Chem. Technik* 16 (9), 1943 (81–2). [G.] D.S.I.R.

31.8. *Defects of Timber*

[1856]. 31.8 : 12.25 : 31.27 : 31.22.2. THUNELL, B. Om vattvedens tekniska egenskaper. [**On the technical properties of wetwood.**] *Medd. Svenska Träforskn. Inst. (Trätekn. Avd.)* No. 3, 1945. pp. 5. [Sw.] *Repr.* from *Trävaruindustrien* No. 7, 1945. P.R.

The occurrence and causes of wetwood in Scots Pine and Norway Spruce are reviewed on the basis of T. Lagerberg's paper ['Barrträdens vattved'. *Svenska SkogsvFören. Tidskr.* 1935.] and an account is given of recent tests on Scots Pine wetwood. Strength properties are summarized in the accompanying table.

Type of Wood	Bending		Compression		Impact		Specific gravity at 12 per cent. moisture (mean for all samples)
	Bending strength ($kg./cm^2$)	Moisture content (per cent.)	Crushing strength ($kg./cm^2$)	Moisture content (per cent.)	Absorbed energy ($kg./cm^2$)	Moisture content (per cent.)	
Wetwood	702 ± 15	11·2	411 ± 7	12·3	$0{\cdot}23 \pm 0{\cdot}01$	11·8	0·39
Normal heartwood	834 ± 27	12·9	464 ± 13	12·1	$0{\cdot}32 \pm 0{\cdot}02$	12·0	0·51
Normal sapwood	863 ± 19	12·9	468 ± 9	12·3	$0{\cdot}29 \pm 0{\cdot}01$	10·7	0·47
Small clear specimens of Swedish Pine*	850	12	480	12	0·40	12	0·45

* From work noted in *For. Abstr.* 4 (232).

Sooner or later, wetwood in living stems always develops fissures which become large enough to be visible to the naked eye and have woolly edges owing to the separation of the secondary membranes of spring tracheids from the middle lamellae. Wetwood checks seriously during seasoning, a phenomenon often attributed to greater shrinkage, but the present investigation has shown that neither the shrinkage coefficients nor the fibre saturation point of wetwood differ appreciably from those of normal wood. The most probable cause of the checking is reduced lateral coherence of the fibres, and this view is supported by the microscopic appearance of the wood and its greater rate of water absorption above fibre saturation point, as compared with normal wood.

32. HARVESTING OF WOOD. LOGGING

See also *For. Abstr.* 8 (Nos. 2184–91)

[1857]. 32 : 07.7. SIMMONS, F. C. **Northeastern loggers' handbook: preliminary review edition.** Northeastern Forest Experiment Station, Philadelphia, Pa. Sect. 1–5, 7, 9, 10, 1946. pp. 10; 14; 10; 7; 5; 14; 15; 18.

This practical handbook for woodcutters is being first issued in parts in order to get criticism and emendations. The parts so far issued deal with (1) choosing an axe, (2) choosing, using and sharpening a cross-cut saw, (3) choosing and maintaining a bow saw, (4) wedges, (5) cart hooks and pulp hooks, (7) power saws, (9) limbing and cross-cutting the tree, (10) ground skidding with horses.

[1858]. 32 : 12.25–8. **Guide for cutting Loblolly Pine of the Eastern shore.** U.S. Forest Service. No. *AIS*–2, 1945. pp. 8.

Also similar guides for cutting Red Spruce, Oak forests and New England northern hardwoods.

32.2. *Felling and Related Operations*

[1859]. 32.2. POND, T. M. **Device for removing axe handles.** *Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 852 (B–7–b), 1946. p. [1].

[1860]. 32.25 : 07.7. POWELL, N. A. **Hints on tree felling and cross cutting with power driven chain saws.** *Aust. Timb. J.* 12 (6), 1946 (317, 345, 347).

The writer has for 4 years been using an American power-driven chain saw for felling and cross-cutting Australian hardwoods, and has had no difficulty in improving on the times stated in the manufacturers' pamphlets. The article gives practical notes on the best methods of using such saws.

[1861]. 32.25 : 07.7 : 12.26–8. **Wedges by Carter.** *Timberman* 47 (12), 1946 (38, 84).

A factory near Corvallis, Oregon, is now manufacturing more than 100,000 wedges of Oregon White Oak (*Quercus garryana*) for use in felling and cross-cutting. Notes are given on the method of cutting the wedges, which is a two-man job. The finished and sanded wedges are piled in an open shed. They are not completely seasoned. Ten-in. and 12-in. felling wedges sell at $12.50 a hundred, and 10- and 12-in. power-saw wedges at $17.50 a hundred. The average feller or cross-sawyer uses about 10 wedges a month. The advantages claimed for wooden wedges are that a sledge is not needed to drive them home and that they are much lighter to carry.

[1862]. 32.25.5 : 07.7. HOLVECK, J. E. **The ring type hydro barker.** *Paper Tr. J.* 123 (2), 1946 (37–9). P.R.

The construction and operation of the ring type hydraulic barker are described. The barker is economical to work, is suitable for logs of any diameter and length and has unlimited capacity for large production mills. The logs are conveyed longitudinally through the barker ring and the installation can be placed at any point between the log and chipper in a pulping mill, or ahead of the carriage saw in a sawmill. Normal logs up to 35 in. in diameter are barked in one pass, logs 37 to 60 in. in two passes. The barker and conveyor are worked by simple controls, and can be adjusted to the requirements of all types of abnormal log. *From author's abstract.*

[1863]. 32.25.5 : 07.7. SHAW, E. C. **Hydraulic barking of small logs.** *Paper Tr. J.* 123 (6), 1946 (41–2). P.R.

[1864]. 32.29. WHITFIELD, N. C. **Re-logging.** *Timberman* 47 (12), 1946 (50, 52, 54).

The writer discusses some of the factors to be taken into account when planning re-logging operations; the more important of these are amount of material, type of material, equipment, labour, transport, and the economics of the operation. There is an opportunity for machinery builders to evolve special equipment for this work, particularly loaders. The essential qualification for re-logging equipment is mobility.

[1865]. 32.29.1 : 07.7 (47.0). TRUBNIKOV, M. Korchevanie pney na lesosekakh. **[Stump-grubbing on felling sites.]** *Trud. vsesoyuz. nauchno-issledov. Inst. lesnogo Khoz.* No. 12, 1940 (116–50). [Russ.]

An account of stump-grubbing procedure and equipment, including tractor, horse and manual machines and grubbing with hand tools alone. Tables are included to show (*a*) time taken to extract and clean one stump and output of stumps per gang per day, for each method, according to time elapsed since felling, diameter of stump, and species (Pine, Spruce, Birch, Aspen); (*b*) time per stump and output per day for cleaving and stacking the wood; (*c*) yield of fuelwood from stumps, of various diameters, of the same four tree species. For a stump of average diameter for the range considered, manual grubbing is 2·6, grubbing with hand machine 2·3 and with a horse machine 1·81 times less effective than by tractor machine. Brief suggestions are added on possible improvements in the design of equipment and on safety precautions for workers.

32.7. *Loss in Logging. Incidental Waste*

[1866]. 32.7 : 33.17 : 32.29.2. **Cutting lumber from slash: utilizes forest product usually burned.** *W. Cst. Lumberm.* 73 (8), 1946 (63, 108).

32.8. *Grading and Storage of Wood in the Rough*

[1867]. 32.81 : 33.4 (494). BURGER, H. Bautechnische Bewertung und Sortierung von Schnittholz und die Aufgabe der Forstwirtschaft. **[The evaluation and grading of timber for building purposes and the part played by silviculture.]** In *Die bautechnische Bewertung und Sortierung von Schnittholz.* Schweizerischer Verband für Waldwirtschaft, Solothurn. 1942 (3–16). [G.g.] P.R.

The paper, originally given at the International Conference for Wood Utilization at Zürich in 1939, contains a brief description of the most important natural characteristics affecting the quality of timber, i.e. shape, straightness, annual rings, fibre direction, etc. Suggestions are made as to ways in which forest management can help to produce first-rate timber. Methods of rough grading in Switzerland are discussed, and recommendations for more detailed classifications are made.

[1868]. 32.82 : 33.02. STEWART, O. **Fire protection of pulpwood.** *Pulp Paper Mag. Can.* 47 (10), 1946 (82–5).

One of the most important protection measures is to limit the size of piles: 20,000 cords is a good maximum for a stacked pile, which should not be more than 200 ft. wide nor more than 90–100 ft. high; any part of the surface can then be reached by at least one monitor nozzle stream. Space between piles may be 100 ft. if there is plenty of water for damping down adjacent piles while fighting a burning pile, otherwise greater space is needed. Many mills define the limits of the pile with a low concrete wall or hand-stacked wood about 15 ft. high, which prevents piles from encroaching on buildings, hydrants or other fixed equipment or on each other. Many mills have erected a

special log-pile type of monitor nozzle on towers, so as to command all surfaces of the piles. Stress is laid on the need of keeping the yard clean, housing engines in concrete buildings to prevent flying sparks, damping down piles in dry weather. Notes are added on methods of fighting a pulpwood fire.

[1869]. 32.82 : 33.36.1 : 12.26–8 : 13.2. MASSACHUSETTS. **Massachusetts Agricultural Experiment Station: annual report for the period ending June 30, 1944.** *Bull. Mass. agric. Exp. Sta.* No. 417, 1944. pp. 78.

Report on testing of various sprays to prevent scolytid infestation of individual Elm logs. Two sprays were found to be very successful—a mixture of orthodichlorobenzene and No. 2 fuel oil mixed one to eight by volume and applied at the rate of 240 cc. per sq. ft. of bark, and a mixture of creosote and paraffin mixed one to four by volume and applied at the rate of 160 cc. per sq. ft. In both instances spraying done just before *Hylurgopinus rufipes* began to dig their first egg galleries completely prevented *H. rufipes* infestation. It is important that the entire bark surface should be thoroughly covered with spray, particularly in all crevices. The large Elm borer, *Saperda tridentata* was also apparently repelled by these sprays.

Freshly cut Elm logs lying in a north–south direction in the sun at Amherst, Mass. were rolled 180 degrees of their circumference (1) every week and (2) every second week during the early-season oviposition period of *H. rufipes* (May 19 to July 2). In comparison with control logs piled in the shade, logs turned over at one-week intervals were practically free from infestation. Results were almost as good when logs were turned at two-week intervals. Warm, sunny weather improves the practical value of this measure. It is suggested that a combination of turning and laying logs in the sun might save material and time (pp. 41–3).

32.9. *Transport*

[1870]. 32.91.22. **Timber handling: combined truck and hoist reduces costs.** *Timb. Tr. J.* 178 (3646), 1946 (167).

Description of a compact machine consisting of a four-wheeled truck with a petrol-electric drive, which is capable of lifting and transporting loads such as crates or stacks of timber up to two tons and elevating them to a height of 9 ft. for stacking purposes.

[1871]. 32.91.3 (54.5) : 33.52 : 38.5. CHIPP, W. **Floating sleepers: a railway sleeper flume in the Himalayan forests.** *Wood* 11 (9), 1946 (248–51).

Description of a 2½-mile wooden flume constructed in the Himalayas to facilitate the extraction of sawn timber. The steepest gradient was 40°, and the sharpest curve was of 80 ft. radius. The total quantity of timber passed down the flume was just under 18,000 tons; the capacity per hour averaged 17 tons. The cost of floating the whole material over the 2½ miles was 1*s.* 3*d.* per ton.

[1872]. 32.92–4 : 07.7. **Bundling logs into truckload units for rafting.** *W. Cst. Lumberm.* 73 (9), 1946 (68–9, 104).

Description of a method of bundling logs, used by the Crown Zellerbach Corp. at Port Angeles. Logs are brought in trucks to the log dump, the whole load is lifted by a crane, the truck is driven away, the logs are lowered almost to road level, and while they are being scaled two men place a 1¼-in. Acme steel band round each end of the load, cut it off so that the ends overlap, and fasten it with a metal clip. The bundle of logs is then lowered into the water, and an identification tag is tied to one of the bands. This tag is numbered to correspond with the scale-sheet ticket of the load, which is the permanent record of its size, number of logs, and species of each. By this way of marking it is possible to pick out particular bundles for filling certain requirements of size and species even though the bottom logs of the bundle are not visible. When enough of these bundles are in the boom pocket they are towed away for storage or rafting with larger logs.

[1873]. 32.92. FOGH, I. F. **Log flumes as an aid in the driving of small streams.** *Woodl. Sect. Index Canad. Pulp. Pap. Ass.* No. 831 (B–9–d), 1946. pp. 6 + fig.

Emphasis is laid on the advantages of the V-type log flume over ordinary log slides or box sluices, when logs need to be carried down subsidiary streams. The construction of such a flume is described and illustrated.

[1874]. 32.95 (494) : 07.7 : 38.4. En Suisse: Une technique nouvelle pour la mise en valeur des forêts de montagne. **[In Switzerland: a new technique for exploiting**

mountain forests.] *Rev. Bois Appl.* 1 (7/8), 1946 (19–22). [F.] P.R.

A description is given of the Wyssen telpher, which is said to offer a comparatively easy and economical method of clearing felling areas in mountainous regions.

[1875]. 32.96 : 07.7. SYMONS, R. C. **Log loading costs.** *Timber of Canada* 7 (1), 1946 (113–5).

Description of a mechanical log-handling procedure using a strong industrial engine with fluid coupling, a specially designed winch, special wire rope of the right gauge, and anti-friction blocks. The method is illustrated by diagrams.

[1876]. 32.96 : 07.7. **Aluminium pulpwood loader.** *Pulp Paper Mag. Can.* 47 (10), 1946 (129–30).

Description of a new pulpwood-loader, weighing less than 1,000 lb., designed and manufactured by the Rite Equipment Co. of Mobile, Alabama. The loader can handle 5½ cords in 31 minutes from a stock pile.

[1877]. 32.96 : 07.7. **Mobile loader gets results.** *W. Cst. Lumberm.* 73 (9), 1946 (70, 73).

Description of the Thew-Lorain Moto-Crane which was designed for military use during the war and is now being successfully used for log loading by the Pilot Rock Lumber Company, Oregon. Its great advantage over previous log loaders is its much greater mobility.

33. CONVERSION AND PRESERVATION OF WOOD

[1878]. 33 (87) : 35 : 09.7. AVELLAN, J. El problem maderero de Venezuela. [**The timber problem in Venezuela.**] *Rev. int. Bois* 13 (109/110), 1946 (131–9). [Span.]

Deals in general terms with the actual and potential timber production of Venezuela, the broad characteristics of Venezuelan forests, timber exploitation, the timber market, the timber industry, reafforestation, the effects of forest fires, exploitable timbers, and preservative treatment.

Mahogany and Cedar are the two species almost exclusively exploited at the present time. Timber for constructional purposes is largely imported. The author favours strict limitation of the exploitation of valuable species, preservative treatment of less durable timbers, and the taxation of imported timbers.

33.1. *Mechanical Conversion excluding the Manufacture of Mechanical Pulp*

[1879]. 33.1 : 07.7. **The 'Cintel' metal detector.** *Timber News* 54 (2084), 1946 (226). P.R.

A brief account of a small portable instrument for locating metal in timber, which has been produced by Cinema-Television, Ltd. It is claimed that the detector, working under average conditions, will pick out the position of metal bodies embedded in wood to the depth of 9 in. The instrument can be used with the greatest certitude when a natural, metal-free space has been cleared for the inspection of logs.

[1880]. 33.1 : 07.7. **New metal detector.** *Sth. Lumberm.* 173 (2173), 1946 (69).

The General Electric company has developed a metal detector for detecting the presence of stray metal in non-metallic materials before it causes damage to processing material. Some description is given of the device and its operation, which does not require technically trained personnel.

[1881]. 33.1 : 07.7 : 33.53 : 31.8. **A detector for metal objects embedded in a solid body.** *Res. Rep. Post Off. Res. Sta.* No. 12444, 1945. pp. 5 + fig.

A description and illustration of a portable apparatus used by the Stores Department of the Post Office to locate metal objects in recovered telegraph poles. The apparatus is capable of detecting and locating metal objects approximately of 1 cu.cm. if made of iron, in a pole up to 16 in. in diameter.

Use of Wastes

[1882]. 33.1 : 34.6 : 01.6. WHALLEY, M. E. **Abstracts on utilization of sawdust.** National Research Council of Canada, Ottawa. 1945. pp. 103. P.R.

33.12. Joinery, Turnery

[1883]. 33.12 : 07.7. **New wood workers' cramp.** *Mech. World* 120 (3111), 1946 (184). P.R.

A description and illustration of a new type of aluminium-alloy woodworkers' cramp made by Whiteson Traders Ltd., Huddersfield. The slide bar is of channel section and, in consequence, very rigid. The jaws are double-sided

and operate both above and below the slide bar at once. Cramping motion is applied by lever action.

[1884]. 33.12 : 07.7. HAYCOCK, A. H. **Boring machines and methods.** *Wood* 11 (8), 1946 (234–7).

[1885]. 33.12 : 07.7. HAYCOCK, A. H. **The slow-speed router.** *Wood* 11 (9), 1946 (264–7).

[1886]. 33.12 : 07.7. HAYCOCK, A. H. **The high-speed router.** *Wood* 11 (10), 1946 (294–7).

[1887]. 33.12 : 31.0. Les bois de menuiserie et d'ébénisterie. [**Woods used for joinery and cabinet-making.**] *Tech. et Archit., Paris* 2 (9/10), 1942 (296–9). [F.]

The nomenclature and physical properties of the chief woods used in joinery and cabinet-making are set out in tabulated form.

33.15. Manufacture and Use of Veneers and Laminated Wood. Improved Woods. Laminated Materials other than Wood. Glues and Gluing

[1888]. 33.15. KNIGHT, R. A. G. **Modern usage of wood.** In *Industrial Research.* Todd Publishing Co. Ltd., London and N.Y. 1946. pp. 109–14. P.R.

A summary of modern developments in the fabrication and uses of laminated wood.

33.15.1. *Manufacture of Veneers and Laminated Wood*

[1899]. 33.15.1 (43.1–5). **German plywood industry. Report by members of the British Plywood Manufactuers Association on interrogation of Dr. Doffine at Wimbledon.** *Final. Rep. Brit. Intell. Obj. Sub-comm.* No. 602 (Item No. 2), 1946. pp. 5 + 3. P.R.

[1890]. 33.15.1 (94). DALE, F. A. **Wood laminating and moulding.** *For. Prod. News Lett. C.S.I.R. Aust.* No. 141, 1946 (1–2).

A brief account of the methods of laminating wood and moulding plywood by fluid pressure in an autoclave.

33.15.2. *Use of Plywood and other Laminated Wood*

[1891]. 33.15.2 : 31.27. ROTH, L. Untersuchungen über den Schubmodul von Sperrholz. [**Investigations into the shear modulus of plywood.**] *Jb. dtsch. Luftfahrtforsch.* 1939 (653–61). [G.g.] M.A.P.

[1892]. 33.15.2 : 31.27 : 12.26–8. NORRIS, C. B., and MCKINNON, P. F. **Compression, tension, and shear tests on Yellow-Poplar plywood panels of sizes that do not buckle with tests made at various angles to the face grain.** *Rep. U.S. For. Prod. Lab., Madison* No. 1328, 1946. pp. 18 + tbls. + figs. P.R.

A study of the elastic properties and the strengths, at proportional limit and ultimate, of plywood subjected to stresses acting in the plane of the plywood and at various angles to the grain. Investigation of the theoretical relationships is based on tests made on Yellow Poplar plywood specimens so proportioned that they would not buckle or fail because of elastic instability. Incorporated are the theoretical development of equations for calculating the elastic moduli and the strength values of plywood subjected to tensile, compressive, or shear stresses acting in the plane of the plywood and at various angles to the face grain.

Supplements A, B, and C, which deal with compression, tension, and shear respectively, consist of descriptions of the testing techniques used, the data obtained, and such analyses as do not require consideration of the interrelations among the results from the different kinds of tests. The report correlates the data presented in the supplements by analyses derived from the mathematical theory of elasticity and from a second-power interaction formula for ultimate strength and finds that as a whole the agreement between theory and experiment is good. *From authors' summary.*

[1893]. 33.15.2 : 31.27 : 31.22.2. DIETZ, A. G. H., GRINSFELDER, H., and REISSNER, E. **Glue line stresses in laminated wood.** *Pap. Amer. Soc. mech. Engrs.* No. 45–A–37, 1945. pp. 5 + tbls. + figs. P.R.

A mathematical analysis was made of two extreme cases of glue-line stress caused by moisture changes in two parallel-grain laminations of equal thickness. In the first case one lamination was assumed to undergo uniform

moisture changes and set up high shear stress in the glue line without any normal stress perpendicular. In the second case moisture content was assumed to change in a parabolic manner and set up high normal stresses perpendicular to the glue line, but no shear stresses. Formulae for calculating these stresses are given. Tables show some estimated values of shear moduli and Young's moduli for 6 species of wood, and values for maximum shear stress intensity for laminates of these species are given in a second table, assuming, for the first case, that the timber was at 12 per cent. moisture content at the time of gluing and that one laminate subsequently rose to fibre saturation point, or 28 per cent., and, for the second case, that moisture content changes by 16 per cent. in a parabolic manner.

33.15.3. *Improved Wood*

[1894]. 33.15.3 : 12.26–8 : 33.15.1 : 31.27 : 33.8. WEGELIUS, E. Komprimerat skiktträ: dess användning för flygtekniska ändamål. **[Compressed laminated wood: its use in aircraft construction.]** *Repr.* from *Tekn. Tidskr.* Nos. 3, 11, 1940. pp. 14. [Sw.] P.R. WEGELIUS, E. Björkskiktträ samt dess användning för framställning av flygplanspropellrar. **[Laminated Birch and its use in the manufacture of aeroplane propellers.]** *Medd. flygtekn. Komm. Ing. Vetensk. Akad., Stockh.* No. 5, 1941. pp. 15 + gphs + illus. [Sw.] P.R.

Two illustrated reviews, with reference mainly to Finnish work on laminated compressed Birch bonded with Tego film glue. Strength properties are discussed in detail, with tables and numerous graphs.

[1895]. 33.15.3 : 31.22.1 : 31.22.2 : 31.27. STAMM, A. J., BURR, H. K., and KLINE, A. A. **Staybwood—heat-stabilized wood.** *Industr. Engng. Chem.* (*Industr. Ed.*) 38 (6), 1946 (630–4). Also in *Rep. U.S. For. Prod. Lab., Madison* No. *R*1621, 1946. P.R.

Extensive data are presented on the reduction in hygroscopicity of wood when heated beneath the surface of a molten metal over the temperature range 120° to 320° C. and time range of one minute to one week. The degree of reduction in hygroscopicity and equilibrium swelling and shrinkage for a given time of heating is practically doubled for each 10° C. rise in temperature. Reductions in hygroscopicity are shown to be accompanied by appreciable increases in decay resistance and significant losses in strength. Serious losses in strength for many possible uses are not obtained until the reductions in hygroscopicity and anti-shrink efficiency exceed 50 per cent. *Authors' summary.*

[1896]. 33.15.3 : 33.15.5 : 31.27. FINDLEY, W. N., WORLEY, W. J., and KACALIEFF, C. D. **Effect of molding pressure and resin on results of short-time tests and fatigue tests of compreg, with discussion.** *Trans. Amer. Soc. mech. Engrs.* 68 (4), 1946 (317–27). P.R.

Tests were made to obtain information on the effect of different moulding pressures and different resins on the 'static' strength properties, stiffness and fatigue strength of 'compreg'. Resins used were:—(A) Bakelite BV 10678 (alcohol-soluble), (B) Bakelite BV 15100 (water-soluble), and (C) Compregnite (water-soluble). Experiments are described and the results given in full. A summary of strength properties calculated showed that a panel moulded at 1500 p.s.i. with resin B had the best values in 9 out of 14 items tabulated.

33.15.5. *Glues and Gluing*

[1897]. 33.15.5. MATAGRIN, A. Colles synthétiques pour les industries du bois. **[Synthetic glues for wood industries.]** *Rev. int. Bois* 13 (107/8), 1946 (99–103). [F.]

A résumé, for the benefit of French readers, of a report of the Forest Products Laboratories, Madison [see *For. Abstr.* 7 (No. 1273)].

[1898]. 33.15.5. PINTO, E. H. **Synthetic resin cements: the urea-formaldehydes.** *Wood* 11 (9), 1946 (261–3).

A general comparison of urea-formaldehyde and phenolic glues, their damp- and mould-resistant qualities, strength and pressing temperature; the use of fillers and foam in reducing production costs. Charts are given showing the form in which hot- and cold-pressing urea-formaldehyde adhesives are sold, and information is included on the working life, application, press temperatures, pressure requirements and conditioning of both types of adhesive.

[1899]. 33.15.5. Roš, M. Die Melocol-Leime der Ciba-Aktiengesellschaft, Basel. **[The Melocol-glues of the Ciba Company Ltd., Basle.]** Eidgenössische Materialprüfungs- und Versuchsanstalt für Industrie, Bauwesen und

Gewerbe, Zürich. 1945. pp. 12 + 188 + 8. [G.g.f.ital.e.span.] P.R.

A detailed account of the performance of Melocol glues, synthetic resin products made from melamine, urea and formaldehyde. 'Melocol H' is resistant to cold water, but not to boiling water. 'Melocol M' is used only for making joints at high temperatures, is resistant to cold water, and endures well in boiling water. Experiments were made to assess the compression and tensile shear strengths of Fir and Beech wood glued with Melocol glues. Specimens were tested in an air-dry state, after being subjected to damp and wet storage, and also after being kept alternately in air and water. The results of the tests are shown by graphs, figures and illustrations, and the permissible loads are calculated. A comparison of tests made with Melocol glues, glutine and casein glues, emphasizes the marked superiority of the Melocol glues. The results of ageing tests on glued joints of Beech plywood are also given. Appendices give an account of various constructions in which Melocol was used.

[1900]. 33.15.5. BEATY, J. D. **Production factors affecting the bonding of Douglas Fir plywood with synthetic resin adhesives.** *W. Cst. Lumberm.* 73 (1–6), 1946 (90–1; 109–10, 113, 115; 82; 101–2; 92, 94; 87, 89, 91–2).

A large number of factors was investigated in the study here reported on, and details are given of the methods employed and results obtained. Four factors affected the quality of the bond significantly: method of sampling, pre-curing of glue; variations in glue spread, and adhesion in various areas of panels. The method of sampling plywood affects the results obtained from shear tests, because of the effect of the core veneer on shear strength. The importance of obtaining the maximum number of core specimens from each panel to be tested is stressed and a method of doing this is suggested. Pre-curing of glue results from faulty placing of panels in the hot-press loader. To minimize this source of variation in quality, well trimmed, freshly dried, flat veneers should be used and the hot-press loader kept in perfect mechanical repair. Under existing methods of applying glue to the core veneer, variations in glue spread can never be entirely eliminated, because two specimens of core of the same size but different grain texture and density, may pick up widely different quantities of glue. As a safety factor the average pick-up of glue must be in excess of actual requirements, in order that those pieces of core which pick up light glue spreads shall have sufficient for a satisfactory bond. A further safety factor is required, because the bottom panels in the batches require more glue than the top panels and all panels in any batch must be glued with the spreading machine in the same adjustment. The glue spreader should always be in perfect mechanical condition and the exact quantities of glue recommended by the manufacturers should be used. Adhesion near the edge of panels is poorer than in the centre owing to pre-curing. Pressing each panel immediately after assembly in order to flatten the veneers and exclude air from the glue will prevent pre-curing.

[1901]. 33.15.5. GOLICK, A. J. **Stored heat gluing technique.** *Timberman* 47 (11), 1946 (84). Also in *B.C. Lumberm.* 30 (10), 1946 (89).

The 'stored heat' method of gluing is a process which accelerates the setting reaction of resin adhesives, and which has been patented by I. F. Laucks, Inc. Usually one of the surfaces to be joined is pre-heated by steam plates, electrical strip-heaters, or other methods, the glue is applied to the other surface, the units are assembled and pressure is applied promptly. The operations vary according to requirements. For the best results, the panels are pre-heated to a temperature of about 300° F. in a hot press, two panels per opening. Three minutes pre-heating time is required to obtain the required glue-bond in a two-minute assembly, and at least two minutes pre-heating time for a three-minute assembly. If the panels are pre-heated one per opening, a two-minute heating cycle gives a two-minute setting time. The glue open-assembly time on the unheated surface should average 5 to 10 minutes. The unit should be under bonding pressure within one minute of the removal of the pre-heated panel from the press, etc., and within 30 seconds of the spreading of glue on the first panel. Bonding pressures of 100 to 150 lb. per square inch are satisfactory.

[1902]. 33.15.5. WINLUND, E. S. **Electronic heating in the furniture industry.** *Electronics* 19 (5), 1946 (108–13). L.S.

The article deals with the use of dielectric heating for setting bonding-glues in furniture.

Types of generator circuit, methods of obtaining uniform heating, heating times, etc. are discussed, and the application of this method of heating to the manufacture of core lumber stock, plywood, prefabricated panels and similar articles is described.

[1903]. 33.15.5 : 07.7 : 33.15.1. SCHIFF, G. (to Tyne Plywood Works Ltd.). **Improvements in or connected with the manufacture of laminated and other shaped products.** *Brit. Patent* No. 558,064, Dec. 17, 1943. pp. 3. P.R.

Laminated and other shaped products are manufactured under heat and pressure by means of high-frequency currents, employing two earth electrodes, which may be the head plate and the base plate of the press or mould. A separate plate forms the live electrode, the press and live electrode being connected in a high-frequency circuit. The heating is effected while the material is under pressure.

[1904]. 33.15.5 : 07.7. BOLLING, O. S. (to Mereen-Johnson Machine Co.). **Veneer edge gluing machine.** *U.S. Patent* No. 2,398,353, Apr. 16, 1946. pp. 6 + figs. P.R.

A machine for assembling and gluing edges of wooden veneer sheets is fully described with diagrams. Glue is applied immediately before the veneer edges are brought together and the glue is dried or set by electrical heating elements while the veneers travel through the machine.

[1905]. 33.15.5 : 07.7. BRUYNE, N. A. DE. **Method and apparatus for measuring the amount of coating material applied to a surface.** *Brit. Patent* No. 557,358, Nov. 17, 1943. pp. 5 + fig. P.R.

The particular application of the method and electrical apparatus (illustrated) is for measuring the 'spread' of glue on veneers in plywood manufacture. The electrical resistance of the coating material is compared with that of the desired amount of the same material, which has been predetermined.

[1906]. 33.15.5 : 31.27. OLSON, W. Z., BENSEND, D. W., and BRUCE, H. D. **Resistance of several types of glue in wood joints to fatigue stressing.** *Rep. U.S. For. Prod. Lab., Madison* No. 1539, 1946. pp. 4 + tbls. + figs. P.R.

Wood specimens with glue joints made with 8 types of glue were tested for fatigue stress by subjecting them to repeated stressing, while, at the same time, matched specimens of the same type, and lap joints of plywood were tested in shear, in order to find any relationship which might exist between resistance to fatigue stressing and shear strength. The results indicate that the resorcinol, melamine and alkaline phenol resins were superior to the urea resins and the casein in withstanding repeated stressing. The wood adjacent to the acid phenol glue was injured by the acid of the glue and failed with shallow wood failure. With resorcinol glues a thick glue line was superior to a thin one, and the converse was true of the urea glue. Comparison of the results of fatigue stressing and shear tests indicate that there is no relationship between the shear-strength values and the number of repeated stress cycles to cause failure, and, therefore, the shear testing of a glued joint is not a satisfactory criterion of the behaviour of the joint in fatigue stressing.

[1907]. 33.15.5 : 31.42. ALEXANDER, P. **Studies on fungi resistance of protein glued plywood with toxic treatments and resin bonded plywood untreated.** *Rep. Douglas Fir Plyw. Ass.* No. 37, 1945. pp. [i] + 11. P.R.

Materials tested included protein-bonded panels treated with toxic and non-toxic proprietary water repellents, walnut-shell-extended and blood-extended resin glues, phenolic resin, urea resin, casein, soy bean, and blood-bonded plywood, and protein-glueline specimens with a toxic substance added to the glue. Results indicated that phenolic resin glues are resistant to fungal attack, but that urea resins will break down after long exposure to mould conditions. All types of protein bonding agents are susceptible to bacteriological attack, but their durability is increased by the addition of chlorinated phenol in small amounts. Maximum durability is gained by the application of a toxic water repellent to a panel made with a toxic glue line. *From author's summary.*

[1908]. 33.15.5 : 33.15.1 : 31.27. FARROW, C. A., HAMLY, D. H., and SMITH, E. A. **Phenolic resin glue line as found in Yellow Birch plywood.** *Industr. Engng. Chem. (Anal. Ed.)* 18 (5), 1946 (307–10). P.R.

A new technique for the analysis of phenolic resin glue lines is described. The method involves complete removal of the veneers by digestion with chromic acid, the glue being left in an unaltered state suitable for microscopic

examination and subsequent stereophotomicrography. The relation of wood structure to the penetration of the adhesive is discussed with suitable illustrations. *Authors' summary.*

33.16. Wood-wool (Excelsior) Manufacture. Wood Flour

[1909]. 33.16 (44). RIEUF, H. La fibre de bois et ses applications. **[Wood wool and its uses.]** *Bull. Off. tech. Emball.* No. 15, 1945 (1–7). [F.] P.R.

A brief review of the manufacture and uses of wood wool in France and her colonies. Among the uses described are packing, stuffing, filtering, insulation, manufacture of fibre boards, etc.

[1910]. 33.16. ARIES, R. S. **Wood flour production.** *Timberman* 47 (10), 1946 (72, 74–6).

Notes on the uses, properties, and types of wood flour and the process of manufacture. Two-thirds of that produced in the United States is manufactured from White Pine wood; the remainder is made from Poplar, Spruce, Hemlock, Maple and Birch.

33.17. Sawmilling

[1911]. 33.17. Aménagement du chantier de grumes d'une scierie. **[Organization of the log yard of a sawmill.]** *Rev. int. Bois* 13 (109/110), 1945 (144–6). [F.]

A description of methods of transporting logs from storage yard to sawmill, dealing mainly with the lay-out of rails, points, and turntables and the installation of a conveyor.

[1912]. 33.17 : 07.7. **Latest in fast sawmills.** *Timberman* 47 (12), 1946 (34–7, 68, 70, 72).

Description of a new sawmill at Medford, Oregon, which is almost completely automatic in operation. The mill has a capacity of 9,000 ft. an hour and has been so planned that only 6 men are needed on the mill floor to handle this output. The machinery is worked by electric power, steam, and compressed air.

[1913]. 33.17 : 07.7. **Mechanical offbearer gives smoother production in pulp sawmill.** *W. Cst. Lumberm.* 73 (9), 1946 (64–5).

Description of a device which has been installed and is working satisfactorily in a Washington pulpwood sawmill. It consists of a framework with a 6 ft. arm attached to it. The arm has a spiked, conical head which is depressed mechanically and pushes the heavy slabs or squared balks on to the rollers which carry them to the edger. This work has hitherto been done by hand by a workman armed with a long hook.

[1914]. 33.17 : 07.7. **New log turner.** *Sth. Lumberm.* 173 (2171), 1946 (62).

The 'Oscar' log turner, now being manufactured by the Western Machinery Exchange, Aberdeen, Wash., is proving of great value in medium-sized sawmills. It is built to operate on air pressure, though steam can be used instead of air, and it handles logs up to 48 in. in diameter and 24 ft. long. The use of this turner increased production by about 30 per cent. at two sawmills where it has been installed.

[1915]. 33.17 : 07.7. AREND, A. G. **Power requirements in modern timber and sawmill practice. The types of equipment in use and the grades and kinds of power unit they require.** *Mech. World* 120 (3106), 1946 (44–5). P.R.

[1916]. 33.17 : 07.7. SIMMONS, C. W. **Single unit sawmills for farms and ranches.** Extension Service, Agricultural and Mechanical College, Texas. No. *B*-138, 1945. pp. 39.

[1917]. 33.17 : 07.7. LOTTE and LAMIAUX. La scie à ruban. **[The band-saw.]** *Rev. Bois Appl.* 1 (3), 1946 (18–20). P.R.

[1918]. 33.17 : 07.7. LOTTE and LAMIAUX. La scie circulaire. **[The circular saw.]** *Rev. Bois Appl.* 1 (5), 1946 (23–6). [F.] P.R.

[1919]. 33.17 : 12.25 (943) : 82. WRIGHT, G. W. **Cypress Pine mill study.** *Aust. Timb. J.* 12 (5), 1946 (264–5, 267, 293–6).

Discussion of some results obtained in a mill study in Queensland with a sawmilling licence of 4,500 super. ft. per day, a normal crew of 8, and powered by a 14 h.p. steam engine. Factors considered were frequency of logs, sawn output per hour, sawn output per man per hour, recovery, relation between recovery and mill output per hour, influence of girth class on manufacturing margin, dimensions sawn, relation between girth class and width sawn, frequency of lengths, log yard operations, breast bench time.

[1920]. 33.17 : 33.36.3 : 12.26–8 (94). JOYCE, C. **Increasing log recoveries: Victorian and Tasmanian *Eucalyptus* sawn on 'back'.** *Aust. Timb. J.* 12 (5), 1946 (261–2).

In Victoria and Tasmania, *Eucalyptus obliqua*, *E. regnans* and *E. gigantea* are quarter-cut, a method which was adopted to reduce degrade, mainly surface checking and warping. The writer suggests that, with the present wide-spread use of kiln drying, it should be possible to saw a log into boards as wide as its width allows, and counteract any consequent defects by careful drying and re-cutting, thus greatly increasing the recovery of sawn timber from logs.

33.3. *Chemical Treatment*

[1921]. 33.3 (47.1 : 485) : 01.6. **Technical literature on Swedish and Finnish paper and wood chemical industries.** Moon Memorial Library, New York State College of Forestry, Syracuse 10, N.Y. [1945?]. pp. 31. P.R.

Use of Wastes

[1922]. 33.3 : 34.6. FREEMAN, H. (to Consolidated Paper Corp., Ltd.). **Fuel from pulp-mill waste.** *Canad. Patent* No. 434,345, Apr. 23, 1946. Chem. Abstr. 40 (15), 1946 (4521). P.R.

Hot waste sulphite liquor is sprayed over a mass of wet pulp-mill waste woody material to remove the water. The diluted liquor is concentrated by evaporation and again sprayed over the partially dried mass to dry it further, and deposit combustible solids in it.

[1923]. 33.3 : 34.6 : 11.41.7 : 11.47.13. ALDERFER, R. B., GRIBBINS, M. F., and HALEY, D. E. **Effect of waste sulfite liquor on aggregation of soil particles.** *Industr. Engng. Chem.* (*Industr. Ed.*) 36 (3), 1944 (272–4). P.R.

Soil was treated with a modified and concentrated waste sulphite liquor (Clarion extract) containing approximately 6 per cent. of ash, 4 per cent. non-fermentable carbohydrates, 5 per cent. fermentable carbohydrates and 35 per cent. lignin. The experiments were made both out of doors and under greenhouse conditions. The structural stability and permeability of the soil particles were studied. A study vas also made of the effect of the extract on soil aggregation under greenhouse conditions alone, with rotten manure, with fertilizer and with both. Results indicate that a good soil structure can be obtained through judicious use of the extract. A marked increase in permeability may occur. The quantity of extract must be regulated and intimate mixing assured. A few weeks must elapse before crops are sown, so that the soil organisms may decay the less resistant materials. The addition of an ample quantity of well-balanced fertilizer should precede the treatment.

[1924]. 33.3 : 34.6 : 31.3. BRAUNS, F. E. **The utilization of lignin.** *Bull. tech. Ass. Pulp Pap. Ind. N.Y.* No. 64, 1946 ([1]–[3]). P.R.

A general discussion of the utilization of lignin in waste liquors, with special reference to means of utilizing sulphite waste liquor and isolated lignosulphonic acid salts.

[1925]. 33.3 : 34.6 : 33.32.4. MATVEEV, I. I., IV, O. B., and AGASHENKO, A. R. **Phenol-lignin-formaldehyde resins.** *U.S.S.R. Patent* No. 64,212, Jan. 31, 1945. Chem. Abstr. 40 (15), 1946 (4561). P.R.

Hydrolysed lignin is condensed with phenol in the presence of an acid catalyst; the acid is neutralized, and the product is condensed with CH_2O in the presence of 0·2–2·0 per cent. of an organic base.

[1926]. 33.3 : 34.6 : 12.25. DOUMANI, T. F. and KOBE, K. A. **Paracymene.** *Industr. Engng. Chem.* (*Industr. Ed.*) 38 (3), 1946 (248–50). P.R.

A description is given of a method of obtaining a high yield of exclusively monomercurated products from paracymene, or Spruce turpentine, a by-product of the sulphite pulping of Eastern Spruce in the United States.

[1927]. 33.3 : 34.6 : 34.26. PLATE, A. F., and TARASOVA, G. A. Poluchenie *p*-tsimola iz sul'fatnogo skipidara. **[Preparation of paracymene from sulphate turpentine.]** *Zh. prikladn. Khim.* 17 (11/12), 1944 (576–9). [Russ.russ.e.] [Institute of Organic Chemistry, Academy of Sciences of the U.S.S.R.] L.S.

The aim of the experiments was to obtain *p*-cymene, a valuable component of motor fuel, from the α-pinene of sulphate turpentine.

The reactions of the last-named were studied within the temperature range 380°–520°, in the presence of the following catalysts: (1) chromic

oxide deposited on aluminium oxide (1 : 3); (2) molybdenum oxide on aluminium oxide (1 : 3); (3) a synthetic alumino-silicate. Reactions in the presence of (1) or (2) were similar: at 380°–400° the yield of the cymene fraction was up to 60 per cent. (based on the initial turpentine; or 77 per cent. based on the α-pinene and Δ^3 carene of the latter) and that of the toluene fraction only about 3 per cent. At 500° the yield of the cymene fraction dropped sharply with a corresponding increase in the lower-boiling aromatic compounds.

The alumino-silicate was unsuitable, as it increased the production of lower aromatic compounds, e.g. at 400° the yield of the toluene fraction was about 12·5 per cent.

[1928]. 33.3 : 34.6 : 31.3 : 33.39 : 12.25. HÖPNER, T. **Soluble fission products of Spruce wood obtained in the sulphite pulping process.** *Cellulosechemie* 22, 1944 (33–48, 72–88). Chem. Abstr. 39 (11), 1945 (2403–4); 40 (11), 1946 (3259). P.R.

By withdrawing liquors at hourly intervals during an indirect rayon sulphite cook, in which the liquor contained 5·44 per cent. SO_2 and 0·84 per cent. CaO, Höpner followed the changes in liquor composition and in the stock. The maximum fermentable-sugar content was 2·3 per cent. and the maximum mannose content 1·6 per cent. after 13 hours, both of which remained substantially the same thereafter. Galactose reached its maximum (0·4 per cent.) after 11 hours and then fell off quite rapidly. The maximum pentosan value (1·1 per cent.) was reached after 10 hours and then dropped slowly. Glucose values are questionable but reached about 0·6 per cent. at 13 hours. Analyses of 8 Spruce wood samples showed an average of 11 per cent. mannans and 8·3 per cent. pentosans. In one sample the galactan content was 1·8 per cent. by the mucic-acid method and 1·5 per cent. by fermentation. Springwood contained more lignin and less mannan than summerwood, but the pentosan content was about the same. Compression wood was high in lignin (37·1 per cent.), low in mannan (7·8 per cent.), and contained 7·7 per cent. pentosans. In another set of experiments in which the stock was examined hourly between the 11th and 20th hours the pulp at the end of the cook still retained 4·0 per cent. mannan and 2·9 per cent. pentosans. Besides the simple sugars, the liquors (removed after 8–9 hours of digestion) contained polysaccharides which were purified, precipitated and analysed. Precipitation of the sulphite waste liquors with trypoflavin gave a lignosulphonic acid complex which was practically sugar-free and evidently the sulphite cook destroys lignin-hemicellulose compounds.

The loosely combined SO_2 in sulphite waste liquor (I) is partially combined with sugars (particularly glucose) and partially with lignosulphonic acid (II). The glucose bisulphite addition compound (III) is stable in acid solution and present in an equilibrium. With increasing temperature or with increasing pH, (III) is split. According to Hägglund, (III) causes the difficulty often encountered in the neutralization of (I). The behaviour of (III) and of the loosely combined SO_2 during the neutralization is studied in detail and the results are given in numerous tables and curves. It is found that the equilibrium formation and the equilibrium itself depended upon the pH of the solution. The behaviour of xylose and mannose bisulphite addition compounds is also studied.

33.32. Pulp and Paper Manufacture. Wallboards. Plastics

[1929]. 33.32 (73) : 09.4 : 33.02. **Pulp and pulpwood statistics.** *Fibre Contain.* 31 (8), 1946 (131–5). P.R.

Tables show imports of pulpwood into the U.S. and net supply, consumption and inventories from 1940–45 and for the first 5 months of 1946. Figures for U.S. pulp net supply from 1935 to 1945 in totals and by principal grades with average yearly pulp prices are given. Sources of net supply by grades for 1939, 1941 and 1944 are also included.

[1930]. 33.32 : 01.6. **List of publications on pulp and paper.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*444 (revised), 1946. pp. 36. P.R.

[1931]. 33.32 : 12.26–8. **Chestnut pulp.** *Tech. Suppl. World's Pap. Tr. Rev.* No. 4, 1946. pp. [1]. L.S.

A brief account of the properties and uses of Chestnut [*Castanea* spp.] pulp. In the United States, pulp from Chestnut is made by the soda process, and an efficient refining system for pulp from shavings and a special bleaching process have been evolved. The fibre is very

fine and can be used to advantage with a quantity of long, hard fibre, such as bisulphited Fir. It is put to the best use in paper for fine printing, etc. It has also become an important material in the manufacture of rayon. When specially treated to eliminate pentosans and to maintain the degree of cellulose alpha, Chestnut pulp yields high quality products of 95 per cent. alpha.

[1932]. 33.32 : 12.26–8 : 31.3. JAYME, G., and REH, F. **The effect of age of Poplar-wood (*Populus monilifera*) on its chemical composition and suitability for pulp manufacture.** *Cellulosechemie* 22, 1944 (65–72). Chem. Abstr. 40, 1946 (2978–80). P.R.

Wood taken from three Poplar trees (*Populus monilifera*) was studied to ascertain a possible relationship between age, chemical composition, pulp yield and pulp quality. Of the three samples (I) was 17 years, (II) 22 years, and (III) 43 years old. Brightness was highest in the pulp obtained from (I), and lowest in that from (III). Strength properties of the pulps could not be regularly correlated with age. Poplar shows a marked contrast to Beech, which reaches its maximum cellulose content at 60–100 years and which yields pulps which are inferior to those obtained from the *Populus* species. The use of young Poplar wood (9–17 years) for pulping is advocated.

33.32.1. *Pulp Manufacture*

[1933]. 33.32.1. **Automatic chip sampling.** *Spec. Rep. tech. Ass. Pulp Pap. Ind., N.Y.* No. 356, 1945. pp. 7. P.R.

Answers from 11 American pulping mills to an enquiry put out by the Technical Association of the Pulp and Paper Industry about methods of chip sampling. Chip sampling by hand appears to be more commonly used than automatic methods. Some suggestions for automatic equipment are made.

[1934]. 33.32.1 : 01.4. AUSTRALIA. **Annual report for the year 1945–46: Division of Forest Products, Council for Scientific and Industrial Research.** Forest Products Laboratory, 69–77 Yarra Bank Road, South Melbourne. 1946. pp. 48.

The sampling of wood is a difficult problem, because the cellulose determinations require a sample of certain standard mesh and uniform particle size. An investigation was carried out to ascertain whether it was necessary to take for analysis the total wood sample, ground to pass a 60 mesh screen, with the inclusion of the fine material, or whether the material passing the 60 mesh screen but retained on the 80 mesh screen and consequently of uniform particle size, could be used. It was found that, for accuracy, it was necessary to take the total sample passing the 60 mesh screen and that the grinding process had to be standardized to reduce the fine material to a minimum (p. 11).

[1935]. 33.32.1. AUSTRALIA. **Annual report for the year 1945–46: Division of Forest Products, Council for Scientific and Industrial Research.** Forest Products Laboratory, 69–77 Yarra Bank Road, South Melbourne. 1946. pp. 48.

In investigations on the influence of dissolved salts on pulp and paper properties, a number of commercial pulps were evaluated in distilled water and then in distilled water containing known amounts of chlorides of mono-, di-, and tri-valent metals. Even when the results obtained with the mono-, and di-valent metal salts did not differ significantly from those obtained with distilled water, concentrations of the tri-valent metal salt (cerium chloride) of only 50 p.p.m. influenced the sheet properties. Work is in progress on a method of overcoming the differences due to the variations in the mineral contents of the various water supplies by adding aluminium sulphate in sufficiently large quantities to neutralize these differences (p. 14).

[1936]. 33.32.1. EKMAN, S. E. **Sulphite pulping and pulps.** *Paper Tr. J.* 123 (8), 1946 (46–50). P.R.

A discussion of the differences in cost, fibre properties, purity, colour, strength, speed of hydration, cleanliness, pitch precipitation, and bleach consumption of sulphite pulps, and the variations in processing which cause these differences.

[1937]. 33.32.1 (43.1–5) : 33.33 : 33.39. WICKER, D. B., SMITH, L. H., QUIG, J. B., and SCHILTHUIS, J. J. **Manufacture of dissolving pulp by the sulphite and nitric acid processes at I.G. Farbenindustrie Wolfen.** *Final Rep. Brit. Intell. Obj. Sub-comm.* No. 65, 1945. pp. [ii] + 10. P.R.

The following features of interest were observed.

(*a*) *Sulphite pulp manufacture.*—A hardwood species (Beech) of high density is used, resulting in a 50 per cent. increase in pulp yield per batch. The yield on a weight basis is 42·5–43·0 per cent. of the dry wood. A 100-ton (metric) pulp mill has been successfully integrated with a viscose rayon plant producing, in part, a flake pulp containing 55 to 60 per cent. moisture. Unlined stainless steel digesters are used. The control over pulp viscosity is sufficiently close to permit direct articulation with a viscose rayon plant. Perlon (a type of Nylon) braided tapes, used in lieu of press felts on the Foudrinier machines, permit more effective removal of water by the press rolls and require lower replacement cost than the conventional wool felts. Yeast for food purposes is being produced as a by-product. Sulphite liquor is being recovered and used after concentration to 50 per cent. solids.

(*b*) *Nitric acid pulp manufacture.*—A nitric acid process was used to obtain a highly reactive pulp for the acetate and cuprammonium processes. A local excess of dilute nitric acid makes the process economically feasible. Beech wood is used for reasons of economy and availability and it is claimed to produce a more reactive pulp than Pine. A 12 per cent. NaOH (and HCl sour) is used to produce a pulp of high purity and good clarity for photographic films. The pulp is crêped and dried for acetylation and produced as moist flakes for the cuprammonium process. The pulp is said to be suitable for high tenacity rayon but not as good as cotton linters. *From authors' summary.*

[1938]. 33.32.1 : 12.25. SKOGGARD, C. O., and LIBBY, C. E. **Experimental sulphite pulping of Eastern White Pine (*Pinus strobus* L.)** *Paper Tr. J.* 123 (4), 1946 (41–6). P.R.

The adaptability of Eastern White Pine for the manufacture of sulphite pulp was studied with emphasis on the employment of modified pulping processes.

Dolomitic, sodium-base, and 50-per-cent. dolomitic and 50-per-cent. sodium-base sulphite liquors having 5·69 per cent. free sulphur dioxide, yielded pulps characterized by high bursting strength, good folding endurance, low tearing resistance, and high ether solubilities (0·8 per cent.). Higher screened yields of slightly easier bleaching pulps were secured with sodium-base liquor.

Pre-evacuation of the chips prior to the addition of the liquor improved penetration and resulted in decreased screenings and lower bleachabilities. Impregnation of the chips with the wetting agent, aerosol OS, hindered, rather than aided, pulping.

The results from multi-stage processes involving successive sulphite treatments and one including an alkaline extraction stage were inferior to those obtained from single-stage digestions. In the final stages, strong liquors and high temperatures were necessary to continue the pulping action because the liquid absorbed by the wood in one digestion diluted the liquor added to the following stage by approximately 13 per cent. *Authors' summary.*

[1939]. 33.32.1 : 31.3. GIERTZ, H. W. Bestämning av restlignin. [**The determination of residual lignin.**] *Repr.* from *Svensk PappTidn.* No. 48, 1945 (485–9). [Sw.g.e.] *Medd. svenska TräforsknInst.* No. 7, 1945. P.R.

The amount of residual lignin in bleached pulp may be determined by dissolving the pulp in sulphuric acid of 76 per cent. If the dissolution be carried out with certain precautions, a colorimetric measurement of the resulting brown colouring will give a numerical expression for the residual lignin. The extinction, $\log \frac{Io}{I}$ is called residual lignin number. These colorimetric determinations of the residual lignin have proved to be a suitable means of control in bleaching operation. A definite relation exists between the whiteness of the pulp and the residual lignin number. *Author's summary.*

[1940]. 33.32.1 : 31.3. NICKERSON, R. F., and HABRLE, J. A. **Hydrolysis and catalytic oxidation of cellulosic materials.** *Industr. Engng. Chem.* (*Industr. Ed.*) 38 (3), 1946 (299–301). P.R.

A study was made of unmercerized and mercerized cottons, purified wood pulp, and high-tenacity viscose rayon, in order to estimate the so-called amorphous, meso-morphous, and crystalline components in these materials. The amorphous (most disordered) component appears to hydrolyse readily and to have a relatively high moisture affinity in comparison with the rest of the structure. It is found to be present in the following approximate amounts: unmercerized cotton, 3 per cent.; mercerized

cotton, 7 per cent.; and high-tenacity viscose rayon, 8 per cent. *From authors' summary.*

[1941]. 33.32.1 : 31.3 : 12.25. KRESS, O., and NETHERCUT, P. E. **Evaluation and reduction of pitch trouble in sulphite pulp and pulping.** *Paper Tr. J.* 122 (26), 1946 (31–4). P.R.

Experiments were carried out to determine the adhesiveness of pitch, and a reliable method of evaluating pulp for potential pitch trouble was evolved by collecting the pitch on rotating screens. The effect of aeration of green chips on the stickiness of the pitch in the pulp was studied by means of this test. A limited number of runs showed that this treatment caused a definite change in the physical characteristics of the pitch. Solvent extraction of the chips indicated that the changes produced by this aeration were similar to those which occur in the natural seasoning of wood.

[1942]. 33.32.1 : 34.6 (73). **Survey of wood utilization for alkaline pulping.** *Spec. Rep. tech. Ass. Pulp Pap. Ind., N.Y.* No. 361, 1945. pp. 16. P.R.

A summary is made of the answers to a questionnaire put out by the Technical Association of the Pulp and Paper Industry to 27 American pulping mills using the alkaline processes. The questionnaire deals with the amount and type of wood used, and the utilization of 'chipper fines', sawdust from chippers, slabs or other sawmill waste, methods of processing it, and its effect on the quality of the pulp produced.

33.32.3. *Fibreboards*

[1943]. 33.32.3. KRESSMAN, F. W. (to Continental Turpentine and Rosin Corp.). **Process of preparing fibrous product from wood.** *U.S. Patent* No. 2,400,546, May 21, 1946. Chem. Abstr. 40 (15), 1946 (4521). P.R.

Uniform and highly absorptive organic extractive-free wood fibres, suitable for roofing felt, are prepared by mechanical fibration of wood, followed by extraction with solvents to recover the organic products such as turpentine, rosin, and other compounds, steaming to remove the solvent, and drying the extracted fibres to 12–20 per cent. moisture content. At this stage the desired highly absorbent fibres have a lower density and lower moisture content than the un-defibred, relatively less absorbent particles, and a fairly good separation of the long thin porous fibres from the heavier particles is accomplished by air classification in a special apparatus which is described. Fibration of the wood is carried out in a Banbury mixer.

33.32.4. *Plastics*

[1944]. 33.32.4. **Wood fiber base plastic.** *Mod. Plastics* 23 (8), 1946 (248). P.R.

A table shows the physical properties of 'Duron', a new wood fibre base plastic developed by the U.S. Gypsum Company.

[1945]. 33.32.4. SCHORGER, A. W., and FERGUSON, J. H. (to Burgess Cellulose Co.). **Manufacture of moulded lignocellulosic material.** *U.S. Patent* No. 2,196,277, April 9, 1940. Brit. Abstr. BII, 1946 (178). P.R.

A hot-moulding compound is obtained from natural lignocellulosic material (wood, corncobs, bagasse, etc.), (I) by cooking it at about 148°–200° for about 15 minutes in H_2O (containing an alkali sufficient to give pH 4–6 in the cooked mass at the end of the cook) to remove hemicelluloses, drying the leached material, and treating it with 1 to 10 per cent. of a phenol and/or an arylamine (NH_2Ph). It can be hot-moulded to yield water-resistant masses. The primary product is useful in replacing wood flour as a resin filler, thereby giving better blending and increasing the water-resistance.

[1946]. 33.32.4. SOHNGEN, L. C. (to Las-Stik Manufg. Co.). **Wood putty.** *U.S. Patent* No. 2,204,324, June 11, 1940. Brit. Abstr. BII, 1946 (178). P.R.

A plastic composition which hardens in the air without shrinking, and is suitable for filling cracks in metal or wood is made by impregnating a cellulosic filler with a vinyl resin (I) solution and then adding a semi-drying oil which is not miscible with (I) and thus forms a separate, external phase which acts as lubricant and enables a smooth finish to be obtained. A typical composition is polyvinyl acetate 32, $COMe_2$ 41, wood flour 23, and blown castor oil 4 per cent. by weight. Pigments may also be included.

[1947]. 33.32.4 : 01.6. WEST, C. J. **I. Lignin plastics. II. Paper-base plastics.** *Bibliogr. Ser. Inst. Pap. Chem.* No. 161 (revised), 1945. pp. [162]. P.R.

Abstracts of literature on (I) lignin plastics, (II) paper-base plastics. Part I is in part a

revision of *Bibliographic Series* No. 114, with previous references expanded and brought up to date.

[1948]. 33.32.4 : 34.27 : 34.26 : 12.26–8. SHEPARD, A. F., and BOLNEY, J. F. (to Gen. Plastics, Inc.). **Resin from Cashew nutshell oil and another phenol.** *U.S. Patent* No. 2,203,206, June 4, 1940. Brit. Abstr. BII, 1946 (178). P.R.

A synthetic resin suitable for moulding is produced by heating Cashew nutshell oil with another phenol, e.g. cresol, xylenol, or β–$C_{10}H_7$·OH, with or without a catalyst, e.g., H_2SO_4, $ZnCl_2$, or NaOH, until resinification occurs.

[1949]. 33.32.4 : 34.6 : 33. ARIES, R. S. **Plastics from lignin—I and II.** *Repr.* from *Chem. Industries* Feb./Mar., 1945. pp. [10].

A review of methods of making lignin plastics, both from saw-milling waste and from the waste products of wood-hydrolysis and pulping, with a description of the characteristics and properties of the products, and a comprehensive bibliography.

33.33. Manufacture of Textiles from Wood

[1950]. 33.33. RAYONIER, Inc. **Treatment of chemical wood pulp and production of viscose therefrom.** *Brit. Patent* No. 575,138, Nov. 15, 1943. Brit. Abstr. BII, 1946 (163). P.R.

Improved viscose solutions are obtained from refined chemical pulp by addition of a cation-active quaternary NH_4 compound (0·01–0·20 per cent. by weight) at a stage in the processing prior to the completion of xanthation—preferably directly to the pulp itself. Improvements result in the shredding operation, xanthation and dissolution are more complete, and subsequent filtration is more rapid. The use of methyl-lauryl-piperidinium and cyclohexyldimethyl-lauryl-ammonium compounds is specifically claimed.

[1951]. 33.33 : 33.32.1 : 31.2. MITCHELL, R. I. **Chain length measurements on nitrated cellulosic constituents of wood.** *Industr. Engng. Chem.* (*Industr. Ed.*) 38 (8), 1946 (843–50). P.R.

An account of a method of nitrating wood which offers a means of separating the nitrated cellulosic constituents of wood in a completely soluble, but less degraded state than before. The prepared wood was nitrated in an anhydrous HNO_3–H_3PO_4–P_2O_5 nitrating mixture. With this mixture the cellulosic constituents of the wood are nitrated rapidly, then become comparatively stable towards degradation during further prolonged action of the nitrating acid. The ligneous constituents of the wood are slowly modified by the nitrating acid so that, after a suitable time, they can be removed efficiently by washing with methanol or by boiling with water. The nitrated wood cellulose was then separated into a number of fractions by stepwise solution with successively richer solvent mixtures, as an indication of the distribution of chain lengths that may exist in the original wood. Solutions were made of each fraction, viscosity measurements taken, and degrees of polymerization calculated.

33.34. Dyeing and Bleaching of Wood

[1952]. 33.34 : 33.31. MILLER, G. H. **Wood bleach.** *U.S. Patent* No. 2,397,193, Mar. 26, 1946. Chem. Abstr. 40, 1945 (5222). P.R.

A uniform bleaching of dark plywood or veneer surfaces is attained by use of a solution containing equal parts by volume of H_2O_2 (30 per cent. by weight) and an alkali (NaOH) solution of pH 9·5–10, containing a borax-water-glass buffer. Such a solution is stable for 4 to 5 hours after mixing, dries in about an hour after application, does not raise the grain of the wood, and requires no neutralizer before the use of finishing coats on the wood.

33.36. Preservation of Wood. Seasoning and Drying

[1953]. 33.36. **New protective coating.** *Paper Ind.* 28 (3), 1946 (444). P.R.

A brief account of a new protective coating, 'Cotoid', produced by the Lithgow Corporation, Chicago. It is said to be suitable for concrete, steel and wood surfaces, to be highly resistant to acids, alkalis, chlorides, oils, brines, oxygen, gasoline and alcohol solutions, and to withstand extremes of temperature.

[1954]. 33.36. ANDERSON, A. B., and LOZIER, E. W. **Painting over knots with knot sealer WP–578.** *Res. Lab. Note West. Pine Ass.* No. 21, 1945. p. [1]. P.R.

The formula is given for a synthetic-resin knot sealer (WP–578), produced by the Western Pine Association, which prevents paint failures over knots in exterior house paint.

[1955]. 33.36. KENNEDY, P. S. **Recent developments in wood finishes.** *Mech. Engng.* 68 (3), 1946 (212–4). D.S.I.R.

[1956]. 33.36 : 01.6. **Some books and pamphlets on paints, painting, and wood finishing.** *Tech. Note U.S. For. Prod. Lab., Madison* No. 195 (revised), 1946. pp. [7]. P.R.

[1957]. 33.36 : 33.15.2. ROESGEN, E. Influence de la couleur sur l'échauffement de surfaces en bois (contreplaqué). [**Influence of colour on the heating of wood surfaces (plywood).**] *Aéro-Revue* 20 (11), 1945 (345). [F.] L.S.

Experiments were undertaken to determine the calorific absorption powers of paints and varnishes of various colours suitable for aircraft, when applied to plywood. Cream colour and 'natural' varnished wood showed the smallest rise in temperature. Next came 'aluminium' paint, orange and red, though the 'aluminium' was slower in cooling. Blue definitely caused a greater rise in temperature than the other colours.

33.36.1. *Preservation against Attack by Plants and Animals*

[1958]. 33.36.1. **Timber preservation.** Timber Development Association Ltd., 75 Cannon Street, London, E.C.4. 1946. pp. 45 + plates.

A summary of available information on timber preservation. The main types of preservative and the usual methods of application are described, and their effectiveness and the properties and uses of the treated timber are discussed. An appendix deals with the permeability of timbers and includes a classification of species from various parts of the world according to their permeability. A second appendix gives a list of some proprietary preservatives, with the addresses of manufacturers in the United Kingdom.

[1959]. 33.36.1 : 01.6. **List of publications on wood preservation.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*704 (revised), 1946. pp. 29. P.R.

[1960]. 33.36.1. KROGH, P. M. D., and TURNBULL, J. M. **End-coating control of wood preservative penetration.** *J. S. Afr. For. Ass.* No. 13, 1946 (35–6).

Experiments have been made at the Forest Products Institute, Pretoria West, to discover a satisfactory end-coating in order to ensure uniform longitudinal distribution of prescribed absorptions of preservatives in short laboratory specimens by restriction of penetration to a lateral direction. Satisfactory results were obtained by the use of cellulose acetate dissolved in acetone. It does not bubble under heat, crack on cooling, or penetrate beyond one-quarter of an inch. To render it termite-repellent, a 10-per-cent. admixture of pentachlorophenol should be dissolved in it before application. It may be useful for end-coating of drying samples in piles of timber undergoing seasoning.

[1961]. 33.36.1. VERRALL, A. F. **Progress report on tests of soak and brush preservative treatments for use on wood off the ground.** *Sth. Lumberm.* 173 (2168), 1946 (36–8). [Division of Forest Pathology, U.S. Bureau of Plant Industry.]

Studies were undertaken to secure data on the effectiveness of preservatives applied by brush and soak methods to untreated timber during construction work. The exposure conditions used were designed to give fairly severe decay hazard by rain seepage but to avoid termite and other factors concomitant with soil-burial tests. The concentrations of the preservatives used were 5 per cent. pentachlorophenyl, 0·2 per cent. phenyl mercuric oleate, and 4·5 per cent. copper naphthenate (0·5 per cent. copper) for soak and 18 per cent. copper naphthenate (2 per cent. copper) for brush treatment. For soak treatment the wood was immersed in a galvanized vat to a depth of 2–8 in. for 15, 30, or 60 minutes. Brush treatments were applied with a paint brush, allowing the solution to flow freely on the surface. A second coat was applied one hour after the first. All treatments were done with solutions at air temperature. All test wood was Southern Yellow Pine with a moisture content below the fibre-saturation point at the time of treatment. Inspection of the exteriors of the test units after 1, 2, 3, and 4 years' exposure disclosed steadily increasing decay in the untreated units, but no or little decay in the

treated units. Because the units were painted, decay could usually not be detected until it had reached an advanced stage, so after 3½–4 years' exposure, one-fifth of the units were removed and opened for detailed inspection, which bore out the results of exterior inspection.

Although the test units have been exposed for only 3½–4 years, and further records are needed to determine the maximum benefit to be derived from treatments, the data indicate that short-period brush and soak treatments will extend the life of non-durable woods for uses where they will be subject to rain seepage at joints. The treatments could easily be applied on the job by the ordinary builder. After 3½–4 years' exposure there were no appreciable differences in effectiveness between the soaked and brush-treated units, or between the 15, 30 and 60 minute soaking periods, but it is possible that differences may eventually appear, particularly between brush and soak treatments. There is some evidence that these treatments are also useful in retarding discoloration of paints applied over the treated wood.

[1962]. 33.36.1 : 12.26–8. AUSTRALIA. **Annual report for the year 1945–46: Division of Forest Products, Council for Scientific and Industrial Research.** Forest Products Laboratory, 69–77 Yarra Bank Road, South Melbourne. 1946. pp. 48.

As normal methods for the pressure treatment of timbers do not give satisfactory penetration of Eucalypt truewood, a study was made of the factors affecting pressure penetration of fluids into wood. Preliminary tests to determine the effect of pressure, temperature, viscosity and polarity of preservative, early established the important result that at pressures of about 1,000 lb./sq. in., satisfactory penetration could be obtained in many Eucalypt timbers untreatable by standard schedules used abroad. A pilot plant has been erected to determine the practicability of high pressure treatment for preservation of railway sleepers (pp. 33–4).

[1963]. 33.36.1 : 31.22.3. THEDEN, G., and SCHULZE, B. Untersuchungen über die Bedeutung von Netzmitteln für die Schutzbehandlung von Holz mit wässerigen Lösungen. **[Investigations into the importance of wetting agents in the preservative treatment of wood with aqueous solutions.]** *Holz Roh- u. Werkstoff.* 6 (8/9), 1943 (241–5). [G.g.]

Experiments were undertaken to assess the influence of wetting agents on the penetration of aqueous preservative solutions into wood. The use of a wetting agent on specimens steeped in a preservative solution for 10 minutes or more caused no increase in penetration, but often a decrease. Specimens immersed for a very short time showed an increase in absorption with the use of a wetting agent. Drop tests on wood surfaces showed that the use of a wetting agent could reduce the time taken for the wood to absorb the drop of preservative solution from 22 to 2 minutes. The greater rate of absorption noticed in specimens subjected to steeping for a very short time and the variations in different types of wood are thought to be due to the action of the wetting agent in causing a quicker spread of the solution over the wood surface. With spraying and painting, therefore, the use of a wetting agent is recommended. In the steeping processes it is also desirable, in that it assures an even spread of the solution over the wood surface.

[1964]. 33.36.1 : 31.43 : 13.2. NEW ZEALAND. **Twentieth annual report of the Department of Scientific and Industrial Research.** Govt. Printer, Wellington. 1946. pp. 110.

Preliminary tests with zinc chloride, chlorinated naphthalene, zinc naphthenate, pentachlorphenol, Tanalith, and Celcure have been completed. Water-soluble preservatives did not prevent *Anobium* from ovipositing and, in lower concentrations, tend to prolong larval tunneling. Though oil-soluble preservatives are highly toxic to *Anobium* beetles, the larvae tunnelled for over 4 weeks in timber completely penetrated by the preservatives. Oil-soluble preservatives painted at the rate of one coat for every quarter-inch of timber thickness satisfactorily prevent attack by *Anobium* and *Calotermes brouni* (pp. 46–7).

A series of treatments has been laid down to ascertain if newly-hatched larvae of *Anobium punctatum* are able to live in impregnated wood, and to determine the protective value of thin layers of therapeutants such as are deposited by cold-dipping processes. Work has been commenced on residual contact effects of therapeutants to *Anobium* beetles, in order to ascertain if building timbers can be protected by external application (p. 8).

[1965]. 33.36.1 : 31.43 (68). TOOKE, F. G. C., and SCOTT, M. H. **Wood-boring beetles in South Africa: preventive and remedial measures.** *Bull. Dep. Agric. For. S. Afr.* No. 247, 1944. pp. 37.

Sections are included on (1) Platypodidae attacking green or freshly felled wood, and (2) beetles attacking seasoned wood only, viz.: Bostrichidae, *Lyctus brunneus*, the death-watch beetles (Anobiidae), and *Hylotrupes bajulus*. Methods of control are indicated.

[1966]. 33.36.1 : 31.43 : 13.2 (67.5). VRYDAGH, J. M. Le problème du *Lyctus brunneus*, agent de la piqure des bois. [**The problem of *Lyctus brunneus*, the cause of wormholes in wood.**] *Bull. agric. Congo belge* 37 (1), 1946 (88–126). [F.]

The author was sent by his Government to investigate the serious increase of *Lyctus* infestation in South Africa as a result of the importation from the Belgian Congo of large quantities of timber of the highly susceptible species, *Terminalia superba*. He gives an account of the geographic distribution of the various species of *Lyctus*, detailed descriptions of *L. brunneus*, *L. africanus*, and *L. hipposideros*, their biology, factors favourable to infestation, and a list of the most susceptible species of timber. Preventive treatments are reviewed. Creosote is excellent for some purposes. The Hickson treatment by pressure impregnation with soluble salts needs expensive equipment and discolours the wood, and the salts will leach out if exposed to rain. Treatment with water-insoluble pentachlorphenol is effective and simple, but is relatively costly and the preservative is highly inflammable, an important factor in a sawmill. Treatment with sulphur gives temporary protection by paralysing the ovipositor of the female insect. Infested wood may be sterilized by heat at 52° C. at a humidity determined by that of the wood. Infested furniture may be treated by painting with turpentine, paraffin, or a 5-per-cent. solution of pentachlorphenol. *From author's summary.*

[1967]. 33.36.1 : 31.43 : 13.2. (79.5). FURNISS, R. L. **Carpenter ant control in Oregon.** *Sta. Circ. Ore. agric. Exp. Sta.* No. 158, 1944. pp. 12.

Methods of control in converted timber by means of baits, contact insecticides, fumigants, and dusts. Sodium fluoride and derris have been used successfully against ant colonies in ornamental trees.

[1968]. 33.36.1 : 33.31 (43.1–5). GOTTSCHALK, F. W. **German wood preservatives other than coal-tar creosote for the war period.** *FIAT Final Rep. Brit. Intell. Obj. Sub-comm.* No. 480, 1945. pp. 40.

Investigations were made on the toxic-salt wood preservatives used in Germany during the war. Six German firms in all were examined. Restrictions on creosote in Germany resulted in a widespread need for toxic-salt preservatives. Flunax, Basilit, Wolman (all based on sodium fluoride), and zinc chloride salts were most commonly used at the pressure treating plants. Flunax probably provided about 60 per cent. of the preservative required to replace creosote. Basilit and Wolman salts together accounted for about 20 per cent., zinc chloride 15 per cent. and miscellaneous preservatives 5 per cent. A description of the composition of these preservatives is given. The toxicity test used in the wood-preserving laboratory of the Staatliches Materialprüfungsamt, Berlin is also given and a list of its relevant publications is appended.

[1969]. 33.36.1 : 33.36.2. HAMMOND, R. N. (to General Timber Service Inc.). **Preservation and fireproofing of wood.** *U.S. Patent* No. 2,381,049, Aug. 7, 1945. pp. 3. P.R.

Before treatment with preservative or fire-retardant solutions, wood is immersed in water at a temperature above 120° F., in order to increase the moisture content of the cells and thereby increase the rate of diffusion and depth of penetration of the solution. The prepared wood may also be impregnated with two successive aqueous solutions, which react to form and leave a precipitate in the cells.

[1970]. 33.36.1 : 33.4 : 38.4. MANN, R. H. **Three miles of ammunition piles on treated timber.** *Wood Pres. News* 24 (6), 1946 (51–5, 9). P.R.

A description of the piers at Earle, New Jersey, U.S.A., which were built during the later years of the war for loading ammunition. The project included 3 miles of approaches, a barge pier, an Army and a Navy pier, all carried on creosoted pile and timber substructures. Fender piles are of untreated Oak, and all others of pressure-treated Southern Pine or Douglas Fir. Timber used in the pier and

approach substructures was pressure-treated No. 1, common or better, Douglas Fir. That used for the fire bulkheads was not creosoted, but treated with Wolman salts.

[1971]. 33.36.1 : 33.5 : 12.25. SOUTH AUSTRALIA. **Annual report on the operations of the Woods and Forests Department for the year 1944–45.** Govt. Printer, Adelaide. 1946. pp. 14.

Experiments on the impregnation of railway sleepers, telegraph poles, etc. of *Pinus radiata*, begun in 1936, now indicate that sleepers treated with creosote and creosote oil have excellent decay-resistance, only one out of 486 having needed replacement. They are also relatively free from surface checking and end splitting. Water-soluble preservatives were much less satisfactory, and untreated controls failed badly. It is concluded that creosoted Pine sleepers would give satisfactory service except on sections where traffic is heavy, gradients steep, and curves sharp: in such conditions the much stronger indigenous hardwoods such as Jarrah should be used (pp. 9–10).

[1972]. 33.36.1 : 33.51. RICHARDSON, N. A. **The preservation of pit timber.** *Quart. Bull. Brit. Colliery Owners' Res. Ass.* June, 1945. pp. 3. P.R.

The author advises the use of treated timber in mines for props, bars etc. in permanent roadways, and for ventilation screens and doors and other permanent or semi-permanent underground structures. Zinc chloride, sodium fluoride and other water-borne proprietary preservatives have been found useful. Objections have been made to creosote on account of its dirtiness, smell and inflammability. The wood should be impregnated. A brief description is given of the open-tank hot and cold method.

[1973]. 33.36.1 : 33.53 : 31.27 (68). SCOTT, M. H. **The use of chemically treated wooden poles for telephone and power transmission lines in South Africa.** *J. S. Afr. For. Ass.* No. 13, 1946 (21–34 + plates).

The use of wooden telephone and transmission poles in South Africa dates from the establishment of an experimental wood-preserving plant by the Forest Department in 1922. Treated poles have been subjected to the most favourable conditions for decay and insect attack and have been exposed to severe storms and winds. Many have been struck by lightning and others continually exposed to fire hazard. Careful records show that no properly treated pole has failed in service. The Forestry Department's plantations have provided from thinnings alone a fairly constant and, up to the present, adequate supply of excellent poles. Of the Pines, *Pinus canariensis* is outstanding, excelling in strength, straightness and cylindricality. *P. radiata* takes second place, while *P. longifolia*, *P. palustris*, and certain strains of *P. pinaster* also make excellent poles. Of the gums, *Eucalyptus paniculata* is one of the strongest pole timbers in the world, while *E. microcorys*, *E. maculata* and *E. maideni* all make exceptionally fine poles. *E. saligna* is weaker, but its straightness and general appearance are excellent and it absorbs preservative readily. With increasing demand, it has been found necessary to reserve stands of suitable species for production of poles on short rotations. Some account is given of preparation of poles before treatment and of the various types of treatment used. Creosote is the most generally useful and economic preservative. Comparative figures are given of durability of treated and untreated poles in South Africa, Europe and America; of minimum, maximum and average modulus of rupture of some of the principal pole species used in South Africa; of approximate prices and weights of various dimensions. Experimental tests of creosoted poles showed that no significant weakening resulted from exposure to fire comparable with the usual bush fire; twisting of poles due to spiral grain was negligible.

The average treated wooden pole costs from one-third to one-sixth the cost of a steel pole of the same length, and the treated wooden pole needs practically no maintenance once crossarms have been tightened after the first effect of weathering. Except in the driest areas, on the other hand, the steel pole needs periodic attention, and near the sea there is constant danger of corrosion both inside and outside the pole.

[1974]. 33.36.1 : 33.54. SCHOLZ, H. F. **Treated Paper Birch and Aspen posts give good service.** *Tech. Note Lake States For. Exp. Sta.* No. 246, 1946. p. [1]. P.R.

Durability tests carried out in Wisconsin to compare the service of Aspen and Paper-Birch posts treated with about 1 lb. of zinc chloride solution and untreated Red and White Oak posts, gave the following results:—(1) Unseasoned Aspen posts treated in 1938 and 1939 were still serviceable in 1945. (2) Green

Paper-Birch posts similarly treated resisted decay at ground line, but one-fifth of them showed various degrees of rot at the top. End dipping of tops in hot asphalt increased decay. (3) The top-rotted posts generally had an unequal distribution of zinc chloride. (4) 40 per cent. of Red Oak posts and 27 per cent. of White Oak rotted off at ground line within 7 years.

[1975]. 33.36.1 : 33.54. STARKER, T. J. **Preservative treatments of fence posts: 1945 progress report on the Post Farm.** *Bull. Ore. Engng. Exp. Sta.* No. 9–G, 1946. pp. 17.

Cf. *For. Abstr.* 7 (No. 330). Further information is given on the series of posts representing different species and treatments that are under observation. Notes are given on salt treatment of green material with a mixture of equal parts by weight of corrosive sublimate, arsenic and common salt, inserted into a hole in the post. A life of 15 years has been obtained with 4-in. Douglas Fir so treated.

33.36.2. *Fireproofing*

[1976]. 33.36.2 : 33.15. DALLAS, J. E. **D.F.P.A. fire flue test.** *Rep. Douglas Fir Plyw. Ass.* No. 35, 1945. pp. 15 + tbl. P.R.

An account of a new fire flue test evolved by the Douglas Fir Plywood Association. Apparatus and procedure are described and illustrated. The results of tests on exterior type panels assembled with different resin adhesives, on a fire-resistant treated exterior type panel and on some untreated hardwoods are given.

33.36.3. *Seasoning. Drying*

[1977]. 33.36.3. TIEMANN, H. **Extraordinary drying schemes.** *Sth. Lumberm.* 173 (2169), 1946 (59–60).

A brief review of some recent experimental methods of drying wood, including the use of non-oxidizing gases and fumes, acetic-acid fumes, 'vacuum drying', 'vulcanizing', steam pressure, diathermic heating, chemicals, centrifugal force.

[1978]. 33.36.3:02.1. VILLIERE, A. Manuel de séchage artificiel des bois. **[Manual of the artificial seasoning of wood.]** *Broch. tech. Inst. nat. Bois, Paris* No. 4, 1946. pp. 93. [F.] P.R.

[1979]. 33.36.3 : 07.7. **Thermometers in kiln installations.** *For. Prod. News Lett. C.S.I.R. Aust.* No. 140, 1946 (3).

The most serious sources of error in kiln thermometer readings are outlined for both dry- and wet-bulb types.

[1980]. 33.36.3 : 07.7. POUSSOT, M. Les conditions nouvelles de construction des séchoirs à bois. **[New requirements in the construction of wood-seasoning kilns.]** *Rev. int. Bois* 13 (111), 1946 (135–7). [F.]

The principal use of seasoning kilns in France is by manufacturers, especially manufacturers of furniture, who are usually in a small way of business. The requirements of a kiln are therefore that it should be small, prefabricated, self-heating, and cheap. Details are given of two models which will shortly be put on the market, costing about 175,000 francs and with a capacity of 3–4 cu.m.

[1981]. 33.36.3 : 07.7. RANCOURT, E. DE. Les séchoirs à bois d'oeuvre. **[Timber-seasoning kilns.]** *Rev. int. Bois* 13 (111), 1946 (137–8). [F.]

Description of the 'Calocarbone', a kiln developed by the Fours Gobin Company, made in prefabricated sections, with a capacity of 4, 8 or 12 cu.m., heated either by electricity or by a patent apparatus burning shavings and other wood waste.

[1982]. 33.36.3 : 12.25. MOTTET, A. L., NOLTEN, J. T., and ANGELL, H. W. **Effect of dry kiln air velocity on speed and uniformity of drying Douglas Fir and Western Hemlock.** *W. Cst. Lumberm.* 73 (8), 1946 (76, 78, 80, 112).

In experiments undertaken co-operatively by the Wood Products department of Oregon State College and the West Coast Lumbermen's Association, the data so far obtained are not sufficient to make possible precise recommendations of kiln air velocities and further research is in progress. If the question of kiln-schedule compensation for low air velocities is disregarded, it appears that the speed of drying, but not the uniformity of drying, of the faster-drying West Coast timbers, can be substantially increased in those kilns where air velocity is at present much below 200 ft. per minute.

[1983]. 33.36.3 : 12.26–8. ALMEIDA, G. DE. A industrializacão dos eucalyptos. **[The industrialization of the Eucalypts.]** *Rev. flor., Rio de J.* 4 (1), 1945 (2–9). [Port.]

Owing probably to the special structure of the wood, the disposition of the fibres, and the internal tensions of the cell walls, *Eucalyptus saligna* Smith, like other Eucalypts, shows a

strong tendency to split during seasoning. Splitting is more pronounced in the wood of young trees less than 30 years of age. Only trees exceeding 1 m. in diameter are likely to produce sound industrial timber.

[1984]. 33.36.3 : 31.2 : 31.1 : 33.15.1 : 07.7. THUNELL, B., and LUNDQUIST, H. Trätorkning. I. De fysikalisk-tekniska förutsättningarna för träets torkning. II. Olika faktorers inverkan på torkningshastighet och torkningstid. III. Virkestorkningens genomförande i praktiken. IV. Fanértorkning. [**The drying of wood. I. The physical and technical conditions of wood drying. II. The effect of various factors on rate and period of drying. III. Timber drying in practice. IV. Veneer drying.**] *Medd. Svenska TräforsknInst.* (*Trätekn. Avd.*) Nos. 4, 5, 6, 1945; 8, 1946. pp. 20, 6, 26, 12. [Sw.] *Reprs.* from *Trävaruindustrien* Nos. 8–10, 1945; 16, 1946. P.R.

A critical review of selected literature. Part I (55 refs.) deals with the fundamental factors involved and includes sections on wood structure, pore volume and density, moisture in wood, shrinkage and swelling, the thermodynamics of swelling, and the thermal properties of wood. Part II (16 refs.) discusses the influence of moisture content, density, thickness, atmospheric factors, structural characters, floating, and storage, on rate and period of drying. Part III (34 refs.) deals with control of the condition of wood during drying, drying by heated air (with sections on types of kiln, piling of the timber, drying process and schedules, defects, consumption of energy), centrifugal drying, vacuum drying, electrical and chemical drying. Part IV (22 refs.) has sections on storage, steaming or hot-water treatment, piling, types of kiln and their use, re-drying of veneer purchased from outside, final moisture content, and drying schedules. There are numerous illustrations and graphs.

[1985]. 33.36.3 : 31.22. TIEMANN, H. **The hygroscopic relations of wood.** *Sth. Lumberm.* 173 (2167), 1946 (64–5).

The writer presents and explains a plate of curves showing the hygroscopicity of normal natural wood at relative humidities from 0 to 100, at first time of drying. Curves are drawn for temperatures of 32°, 80°, 120°, 160°, 200°, 212°, and 220° F. They are based on empirical data in many countries and for various species, and may be applied to all except a few exceptional kinds of wood, as a general guide.

33.37. Distillation. Manufacture of Tar

[1986]. 33.37. REITER, A. A., and BEMAN, F. L. (to Cliffs Dow Chemical Co.). **Separation of higher phenols from wood distillate.** *U.S. Patent* No. 2,400,466, May 14, 1946. Chem. Abstr. 40 (15), 1946 (4499–500). P.R.

Subjection of the acetic oil fraction of pyroligneous acid to fractional distillation under reduced pressure, and collection of fractions in which specific gravity, rather than temperature, changes only slightly, results in guaiacol-rich and creosol-rich fractions. The phenols may be separated from these fractions, by precipitation, as Ca salts which, after filtration, are reconverted to the phenols, and steam distilled. Methyl cyclopentenolone is obtained as a by-product from the creosol fraction. Other valuable constituents of the oil remain in recoverable form.

[1987]. 33.37. SUMAROKOV, V. P., and BOGOYAVLENSKAYA, V. N. Poluchenie pirokatekhina iz drevesnogo kreozota putem rasshchepleniya fenol'nykh efirov kreozota pri atmosfernom davlenii. Soobshchenie III. [**Obtaining pyrocatechin from wood creosote by splitting the phenol ethers of creosote at atmospheric pressure. III.**] *Zh. prikl. Khim., Leningr.* 17 (11/12), 1944 (650–5). [Russ.e.] L.S.

[1988]. 33.37 (54.8) : 33.38. BALAKRISHNAN, P. R. **Wood distillation at Bhadravati.** *J. sci. industr. Res., India* 4 (11), 1946 (681–4). I.H.

At Bhadravati, the following species of Mysore hardwoods are used for conversion into charcoal:—*Anogeissus latifolia, Lagerstroemia lanceolata, Pterocarpus marsupium, Terminalia tomentosa, Xylia dolabriformis, Terminalia paniculata, Grewia tiliaefolia, Shorea talura.* A description of the plant and process is given. The main product is charcoal, the average yield of which varies from 25 to 30 per cent. The average amount of wood which can be carbonized per day is 200 tons on a 36-hours cycle. This yields about 60 tons of charcoal of calorific values ranging from 6,200 to 7,500 calories, and 20,000 to 22,000 gallons of pyroligneous liquor. The liquor contains about 3 per cent. of tar in suspension, an equal amount in

solution, about 4 to 5 per cent. of acetic acid and about 3 per cent. of alcohol. The tar is separated from the pyroligneous liquor and distilled to give oil and pitch. The remaining liquor is neutralized and subjected to fractional distillation to produce a crude wood alcohol containing about 75 per cent. of pure alcohol, and 15 per cent. acetone. This is purified by refractionating, after treatment with caustic soda and sulphuric acid to remove resinous and other impurities, to yield a commercially pure methanol containing 99·5 per cent. methanol and less than 0·1 per cent. acetone.

The average yield of by-products per day when the plant works at full capacity is as follows:—acetate 5 tons, dissolved tar 800 gallons, C.P. methanol 350–400 gallons, methyl acetone 50 gallons, black paint 100 gallons, wood preservative or creosote oil 200 gallons, pitch 1 to 1½ tons, disinfectant (kreso) 50 gallons.

33.38. Charcoal Manufacture. Use of Wood and Charcoal in Producer-gas Generators

[1989]. 33.38. UGARTE, J. Estudio analítico de los carbones vegetales. **[Analytical study of charcoals.]** [*Publ.*] *Inst. for. Invest. Exp., Madrid* 14 (28), 1943. pp. 46. [Span.]

[1990]. 33.38 (74). HEERMANCE, E. L. **Charcoal production.** *Timber of Canada* 7 (1), 1946 (116–8). [Northeastern Wood Utilization Council S.C., New Haven 6, Conn.]

Several years ago the State Forestry Department in Connecticut started to revive the local charcoal industry, and to this end designed a portable kiln made of cinder-concrete blocks. Figures are given for a sample charcoal operation on Connecticut hardwoods, using such kilns.

[1991]. 33.38.2 (44). Chronique des gazogènes: Le problème forestier. **[The use of producer-gas: the forest problem.]** *Rev. int. Bois* 13 (111), 1946 (141–3). [F.]

A plea for the continued use in France of producer-gas-driven vehicles, in order at the same time to save imports and make the forest industry self-supporting. A number of suggestions are made for encouraging the use of producer-gas engines.

[1992]. 33.38.2 (54). VERMAN, L. C., KHANNA, M. L., DAS GUPTA, S. K., and ACHUTHAN NAIR, K. **White clinker formation in portable producer-gas plants.** *J. sci. industr. Res., India* 4 (11), 1946 (663–6). I.H.

To examine the clinker formed in Indian charcoal - burning, producer - gas generators, charcoal fractions were separated from foreign matter fractions. It was found that charcoal from bark contains a higher percentage of ash than the interior fractions and that the composition of the clinker resembles that of ordinary cement clinker, all the constituents of which are present in the bark ash. Further experiments with bark-free and bark-rich charcoal confirmed the supposition that clinker formation was caused mainly by the bark present in the charcoal.

[1993]. 33.38.3 : 34.6 : 33.1. STERLINI, M. J. **Fuel briquettes.** *Fr. Patent* No. 891,099, 1944. *Chim. et Industr.* 52, 1944 (Doc. 38). Fuel Abstr. 4 (1/2), 1946 (148). P.R.

The following mixture is compressed:—35 parts sawdust, 30 parts granulated or caked peat, 18 parts charcoal dust, 2 parts coal tar, and 15 parts binder.

[1994]. 33.38.3 : 34.6 : 34.24. PECOUD, P. **Manufacture of briquettes from mineral or vegetable charcoals.** *Fr. Patent* No. 885,266, 1943. *Chim. et Industr.* 52, 1944 (36). Fuel Abstr. 4 (1/2), 1946 (144). P.R.

5 Kg. of residues from the manufacture of tanning extracts from Chestnut wood, are diluted with 10 litres of water, and 85 kg. of dry charcoal are added; moulding and drying follow the usual processes.

33.39. Manufacture of Sugar, Alcohol, and Miscellaneous Chemical Products from Wood

[1995]. 33.39. PARTANSKY, A. M. (to Dow Chem. Co.). **Treatment of wood hydrolysate solutions.** *U.S. Patent* No. 2,203,360, June 4, 1940. *Brit. Abstr.* BII, 1946 (119). P.R.

Materials which inhibit the fermentation of acid wood hydrolysate solutions are removed by adding sufficient CaO to the hydrolysate to adjust the pH to 9–10, and maintaining the pH at this value by adding more CaO while ageing the alkaline solution for 24–48 hours at 20°–40° (25°–40°) C. The resulting liquor is separated from the precipitated solids and neutralized.

[1996]. 33.39 : 12.25. HARRIS, E. E., HAJNY, G. J., HANNAN, M., and ROGERS, S. **Fermentation of Douglas Fir hydrolyzate by *S. cerevisiae*.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1618, 1946. pp. 13 + tbls. + figs. P.R.

In the process of wood saccharification used at the Forest Products Laboratory, Madison, many improvements affecting the ease of fermentation have been introduced. In recent experiments a method of flashing the hydrolysate after neutralization has been used. This removes all but traces of furfural and permits the removal of calcium sulphate at elevated temperatures. The report deals with the effect of these changes on the ease of fermentation, and a study is made of other problems connected with fermentations on a pilot-plant scale, such as yeast requirements, conditions for growth of yeast, methods of removing yeasts from the fermented liquors, nutrient requirements for growing yeast and for fermentation, etc.

[1997]. 33.39 : 34.6 : 33.32.1 (73). TOUSLEY, R. D. **Economic and market aspects of ethyl alcohol from sulphite waste liquor.** *Paper Tr. J.* 123 (10), 1946 (37–40). P.R. See also *For. Abstr.* 8, 1946 (524).

[1998]. 33.39 (73). ISENBERG, I. H. BUCHANAN, M. A., and WISE, L. E. **Extraneous components of American pulpwoods.** *Paper Ind.* 28 (6), 1946 (816–22). [Institute of Paper Chemistry.] P.R.

A survey was made of literature dealing with extractives of American pulpwood species, and a summary is given of the available data on the extractives of 35 softwoods and 29 hardwoods.

33.5. *Sleepers. Poles and Other Roughly Converted Wood*

[1999]. 33.53 (73) : 12.25 : 33.91. **American War Standard. Specifications and dimensions for wood poles—miscellaneous conifers.** *Amer. War Stand.* No. 05.7–1945, Nov., 1945. pp. 11. P.R.

[2000]. 33.53 : 31.27. WILSON, T. R. C. **Fiber stresses for wood poles.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1619, 1946. pp. 9 + tbls. + figs. P.R.

The report presents data on pole production and needs in the United States. Actions of the American Standards Association Sectional and War Committees are reviewed, and a systematic procedure for deriving design stresses for poles of any species is presented. In addition, several topics of interest in connexion with pole line design are considered. *From author's summary.*

33.6. *Packing Boxes, Crates, etc.*

[2001]. 33.6 (71). **Canadian Packaging Committee code: C.P.C.** 1, 11–15, 18. Canadian Packaging Committee. 1945. pp. 16, 23, 59, 19, 15, 16. P.R.

Specifications of various types of wooden packaging.

[2002]. 33.6 (79.4). BURKS, G. F., and BEESON, R. W. **Lumber requirements of the California fruit and vegetable industries.** *For. Res. Note Calif. For. Range Exp. Sta.* No. 46, 1945. pp. 12. P.R.

33.7. *Firewood*

[2003]. 33.7 (73) : 09.4. **Estimated U.S. production of and requirements for fuel wood by regions.** U.S. Forest Service, Washington, D.C. 1945. pp. [2]. P.R.

Figures are given for regional production for the years 1941–45 inclusive.

33.8. *Other Manufactured Products*

[2004]. 33.8 : 31.27. KALKERT, A., and STENZEL, F. Holz als Baustoff für Höchstgeschwindigkeits—Flugzeuge. [**Wood as a constructional material for high-speed aircraft.**] *Jb. dtsch. Luftfahrtforsch.* 1939 (646–52). [G.g.] M.A.P.

[2005]. 33.8 : 33.15.2. **Plastics and plywood in a private plane.** *Mod. Plastics* 23 (8), 1946 (158–60). P.R.

A description of a resin-bonded plywood aeroplane produced by the Culver Aircraft Corporation. The stressed skins of the fuselage, wings and bulkhead are of Poplar plywood with the grain laid at angles of 45° and 90°. Airplane-grade Spruce forms the spars, longerons, stringers and other support members. The spar blocks are of Walnut and the propellers of laminated Birch.

33.9. *Grading of Converted Timber*

[2006]. 33.91 (44). CAMPREDON, J. La normalisation des bois. [**The standardization of wood.**] *Tech. et Archit., Paris* 2 (9/10), 1942 (292–5). [F.] P.R.

A short summary and some extracts from the standards issued by the General Commission

for Wood set up in 1933 within the framework of the Standards Association of France.

[2007]. 33.91 : 31.27 : 12.25. CROSBY, H. S. **Stress grading.** Northern Hemlock and Hardwood Manufacturers' Association, Oshkosh, Wis. [*n.d.*] pp. 3. P.R.

The Northern Hemlock and Hardwood Manufacturers Association's grades of Hemlock have been evaluated in terms of allowable fibre stresses and the values are set out in the report.

[2008]. 33.91 : 33.4. STAUDACHER, E. Bautechnische Bewertung und Sortierung von Schnittholz. [**The evaluation and grading of timber for building purposes.**] In *Die bautechnische Bewertung und Sortierung von Schnittholz.* Schweizerischer Verband für Waldwirtschaft, Solothurn. 1942 (17–29). [G.] P.R.

[2009]. 33.91 : 33.4. STAUDACHER, E. Zusammenstellung der Antworten auf den Fragebogen über bautechnische Bewertung und Sortierung von Schnittholz. [**Summary of answers to questionnaire upon the evaluation and grading of timber for building purposes.**] In *Die bautechnische Bewertung und Sortierung von Schnittholz.* Schweizerischer Verband für Waldwirtschaft. Solothurn, 1942 ([31–40]). P.R.

34. MINOR FOREST PRODUCTS AND THEIR UTILIZATION

34.2. *Vegetable Products*

[2010]. 34.2 : 12.29 : 23.2. GOMES, P. O coqueiro da praia. [**The Coconut Palm (*Cocos nucifera*).**] Serviço de Informação Agrícola, Ministério da Agricultura, Rio de Janeiro. *S.I.A.* 37, 1944. pp. 120 + plates. [Port.] [Departamento de Assistência ao Cooperativismo do Estado da Paraíba.]

34.24. Tanning Materials. Cork

[2011]. 34.24. ANGELO, J. SOSTERO. Substâncias tanantes: determinação da acidez dos liquidos curtientes. [**Tanning substances: determination of the acidity of tanning liquids.**] Serviço de Informação Agrícola, Ministério da Agricultura, Rio de Janeiro. 1942. pp. 10. [Port.] *Separate* of *An. 3° Congr. Sul-Amer. Quim.* (9ª *Secc.*).

Includes a table showing the tannin content of 147 species.

[2012]. 34.24 (82). Evolución de la industria del tanino. [**Evolution of the tannin industry.**] *Mundo maderero* 6 (71), 1946 (1–2). [Span.]

The Argentine Republic is at present the world's principal tannin-producing country. Industrialization of the industry began in 1894, and the first modern factory was installed in 1906.

[2013]. 34.24 : 12.25. LEWIS, H. F., BUCHANAN, M. A., KURTH, E. F., and FRONMULLER, D. **Redwood products as inhibitors of oxidation in petroleum hydrocarbons. Inhibition of oxidation in cyclohexene and gasoline.** *Industr. Engng. Chem.* (*Industr. Ed.*) 37 (11), 1945 (1108–11). P.R.

Solvent-purified Redwood tannins are effective in preventing the oxidation of cyclohexene but are of little value in protecting gasoline because of their solubility. Products prepared by reacting the tannin with benzoyl chloride, caproyl chloride, chloroacetic acid, formaldehyde, and amines appear to have little interest as antioxidants. Condensation of tannin with acetone or other ketones results in a good yield of ether-soluble products which are good inhibitors for cyclohexene. However, the addition of water to the treated cyclohexene results in the loss of approximately half of the inhibiting action. The acetone-tannin condensation products have poor solubility in gasoline and are of questionable value as gasoline antioxidants. Products obtained by condensing catechol with acetone have excellent inhibiting properties for cyclohexene and appear somewhat promising as antioxidants for gasoline. In using cyclohexene in the Winnington-Thomas breakdown test, it is necessary to remove the peroxides in order to obtain duplicate results. [See also *For. Abstr.* 7 (No. 1336).] *Authors' summary.*

[2014]. 34.24 : 12.26–8 : 35 (82). La importancia economica del Quebracho. [**The economic importance of Quebracho.**] *Mundo maderero* 6 (73), 1946 (11). [Span.]

Schinopsis lorentzii yields sleepers, telegraph poles and tannin. The Argentine Quebracho-extract industry dates from 1895 and now has 20 factories employing 25,000 persons and produces 450,000 tons of extract; the capital invested is about $150 million (Argentine). The normal annual cut of Quebracho Colorada for extract is 800,000 tons from Argentina and 200,000 tons from Paraguay.

[2015]. 34.24 : 12.26–8 : 12.11.11. BISWAS, H. G. **Distribution of tannin in different**

parts of the Myrobalan plant (*Terminalia chebula*). *Sci. & Cult.* 9 (9), 1944 (399). L.S.

An examination of various parts of the Myrobalan tree (*Terminalia chebula*) established that tannin is found (in descending order of content) in:—(1) mature green fruits, (2) tender leaves, (3) leaves, (4) rind of the twigs, (5) rind of the trunk.

[2016]. 34.24 (44) : 12.26–8. Le Chatelier, E. M. L'industrie du liège. Sa place dans notre économie. [**The cork industry. Its place in our national economy.**] *Rev. Bois Appl.* 1 (6), 1946 (19–24). [F.] P.R.

The total acreage of Cork-Oak forest in France and her colonial territories is 975,000 hectares, giving, before the war, an annual production of about 553,000 quintals. A short account is given of the production and uses of cork, and of the cork industry in France.

[2017]. 34.24 (469). Natividad, J. Vieira. Grandezas e vicissitudes da subericultura nacional. [**Extent and vicissitudes of cork cultivation in Portugal.**] *Agros, Lisboa* 27 (3/6), 1944 (115–24). [Port.]

An outline of the history of the Cork Oak in Portugal, its economic importance, the results of irrational exploitation (including the apparent regression of the species and decreased soil fertility) and measures for saving the Cork Oak, by legislation, and research.

[2018]. 34.24 (469) : 35. Da Costa, M. Firmino. A cortiça portuguesa. [**Portuguese cork bark.**] *Agros, Lisboa* 27 (3/6), 1944 (131–9 + tbl.) [Port.]

Export figures for cork for the years 1885 to 1943, inclusive, are used to show the importance of cork production in Portuguese economy. The influence of world conditions on the demand for Portuguese cork is discussed.

[2019]. 34.24 : 12.26–8. Machado, D. Pereira. Como se determina a idade de criação das cortiças. [**How to determine the age of cork barks.**] *Agros, Lisboa* 27 (306), 1944 (165–9). [Port.]

34.25. Medicinal Plants

[2020]. 34.25 : 12.21. Bose, S. R. **Antibiotics in a Polyporus** (***Polystictus sanguineus***). *Nature, Lond.* 158 (4009), 1946 (292–6)

Studies on the antibacterial action of the crude filtrate (polyporin) of the wood-rotting fungus, *Polystictus sanguineus*, indicate that (particularly in concentration) it possesses highly selective action against *Staphylococcus aureus, Streptococcus pyogenes, S. viridans, Bacillus typhosus, B. para-typhosus* A., *B. para-typhosus* B., *B. coli, Vibrio cholerae,* and *B. flexneri.* Polyporin is acidic in reaction with pH 5·6–6·4; its antibacterial power is not affected by change of pH range from 2–8; it is thermo-stable and can be stored at room temperature of the tropics without any loss of potency; it can be administered orally, and is completely non-toxic.

[2021]. 34.25 : 12.25. Kolyakova, G. E. **Removal of bitter substances from vitamin-containing extract of tree needles.** *U.S.S.R. Patent* No. 64,587, Apr. 30, 1945. Chem. Abstr. 40, 1945 (5210). P.R.

The needle extract containing vitamin C is placed within a semi-permeable membrane, and the vitamin separated by dialysis from the colloidal, bitter substances.

[2022]. 34.25 : 12.26–8 (54) : 12.11.11. Rakshit, J. N. **Total alkaloids in *Alstonia scholaris*—the popular and well-known indigenous antimalarial drug.** *Sci. & Cult.* 9 (7), 1944 (302–3). L.S.

Samples of bark from *Alstonia scholaris*, growing in various districts of India, were extracted with alcohol in order to assess the total alkaloids. The results are given in a table.

[2023]. 34.25 : 12.26–8. Applezweig, N., and Ronzone, S. E. **Ion exchange process for extracting Cinchona alkaloids.** *Industr. Engng. Chem.* (*Industr. Ed.*) 38 (6), 1946 (576–9). P.R.

A cyclic system for the extraction of alkaloids from crude drugs by means of ion exchange has been devised. Alkaloids of Cinchona were extracted by dilute acid and recovered by ion exchange with an over-all average yield of 81·2 per cent. within an average period of 82 hours. Dried bark from ordinary commercial sources was used. The process lends itself equally well to either small- or large-scale operations and the use of either dry or undried raw material. The use of portable equipment makes possible the exploitation of formerly inaccessible Cinchona stands by drastically reducing the haulage requirements. *From authors' summary.*

[2024]. 34.25 : 12.26–8 (81). Filho, A. Caminha. Da importância da quina e da quinina. [**The importance of *Cinchona***

bark and quinine.] Serviço de Documentação Ministério da Agricultura, Rio de Janeiro. *S.D.A.* 259, 1945. pp. 20. [Port. port.] *Separate* of *Bol. Minist. Agric., Rio de J.* April, 1944. [Conselho Florestal Federal.]

Discusses briefly the conditions for and prospects of *Cinchona* cultivation in Brazil.

[2025]. 34.25 : 12.26–8 (86). Osorio, N. Sobre las quinas de las Estados Unidos de Colombia. [**On the Cinchonas of the United States of Colombia.**] *Rev. Acad. Col. Cienc., Bogotá* 6 (22/23), 1945 (244–73). [Span.] *Abstr.* in *Trop. Woods* No. 86, 1946 (36).

34.26. Resin. Gums. Turpentine. Oils. Rubber. Latex. Sugar

[2026]. 34.26. Najera y Angulo, F. Estudio sobre los perfeccionamientos de que es susceptible el sistema de resinacion Hugues. [**Study of possible improvements in the Hugues method of resin-tapping.**] [*Publ.*] *Inst. for. Invest. Exp., Madrid* 13 (25), 1942. pp. 47. [Span.port.g.f.e.] X.

[2027]. 34.26 (73) : 12.25 : 12.11.3. Dorman, K. W. **High-yielding turpentine orchards a future possibility.** *Chemurg. Dig.* 4 (18), 1945 (293, 295–9). P.R.A.

Production of gum naval stores in the United States has declined from 750,000 units in 1908 to 245,000 units in 1944, owing to neglect and overcutting of natural stands and increased competition from other raw materials. Experiments made by the Southern Forest Experiment Station in the development of high-yielding strains are described, and the advantages of plantations of superior species are discussed.

[2028]. 34.26 (81). Barros, Richomer. Aspectos econômicos da borracha. [**Economic aspects of rubber.**] Serviço de Documentação, Ministério da Agricultura, Rio de Janeiro, Brasil. *S.D.A.* 248, 1945. pp. 47. [Port.]

A general review of the economic importance of rubber in Brazil, the principal rubber-producing plants (*Hevea brasiliensis, Castilloa ulei, Manihot* spp., *Hancornia speciosa, Sapium biglandulosum, S. aucuparium,* and *Mimusops globosa*), extraction processes, and some industrial uses of rubber, both natural and synthetic. On July 9th, 1942, the Rubber Credit Bank (Banco de Crédito da Borracho) was inaugurated with the object of financing rubber production in the whole of Brazil.

[2029]. 34.26 : 12.25 : 12.11.15. Lombard, R. Sur la composition des sécrétions d'abiétinées. [**On the composition of the secretions of Abietineae.**] *C. R. Acad. Sci., Paris* 222 (4), 1946 (237–8). [F.] D.S.I.R.

Further details on a method of analysing the resin acids contained in Pine secretions are given. A table gives the results of the analysis of the resin acids contained in secretions of various Pine species. The secretions of Pines with five needles are rich in abietic acid, while those with two or three needles very rarely contain it. On the other hand the latter contain more laevopimaric acid. The secretions of other Abietineae are comparable with those of Pines.

[2030]. 34.26 : 12.25 (56.43). Davidson, D. F. **Resin tapping experiments (*Pinus halepensis* var. *brutia*).** *Tech. Pamphl. For. Dep. Cyprus* No. 7, 1943. pp. 14. Cf. *For. Abstr.* 3 (154).

[2031]. 34.26 : 12.25 : 31.4 : 31.3 : 31.2. Fernandes, C. Taveira. A resinagem no *Pinus pinaster* Sol. (Pinheiro bravo): sua influência na conservaçâo e resistência nas madeiras. [**Resin tapping in *Pinus pinaster* Sol.: its influence on the preservation and disease resistance of the timber.**] *Agros, Lisboa* 27 (3/6), 1944 (197–205). [Port.]

An account of investigations to determine the percentage of resin in the wood of tapped and untapped Pine, the influence of tapping on resistance to disease and insect attack, and a histological analysis of tapped and untapped wood. Only 29·41 per cent. of the samples tested showed a higher percentage of resin in untapped than in tapped trees. An examination of literature suggests that resistance to disease and insect attack is probably much the same in tapped and untapped trees, that the wood of tapped Pines is harder, contains a little more water, and is richer in resin. The slighter greater density and the higher resin content of the wood of tapped trees compensate for the defect of greater humidity.

[2032]. 34.26 : 12.26–8 (81). Una nueva riqueza de Bahia: el 'mucugé', árbol que produce goma comestible. [**A new source of wealth from Bahia: Mucugé, a tree which produces an edible gum.**] *Mundo maderero* 7 (74), 1946 (14). [Span.]

[2033]. 34.26 : 12.26–8 : 34.27 : 2. **Cashew nuts.** *Bull. imp. Inst.* 44 (2), 1946 (99–102).

A short general account of the Cashew Nut tree (*Anacardium occidentale*), including silviculture and utilization. [Cf. *For. Abstr.* 8 (No. 1541).]

[2034]. 34.26 : 12.26–8 : 34.27. BRAY, G. T. **Cashew nut shell oil. An Indian product of growing importance.** *Chem. Tr. J.* 119 (3085), 1946 (7–8). D.S.I.R.

A brief discussion of the Cashew nut shell oil industry, with a short account of methods of extracting the oil, and its properties and uses.

[2035]. 34.26 : 12.26–8 : 34.27. HARVEY, H. I. **A review of the fifteen British Patents on Cashew nut-shell liquid and resins.** *Paint Technol.* 10 (119; 120), 1945 (289–94, 323–5). L.S.

[2036]. 34.26 : 12.26–8 : 12.14.7. RAO, P. L. N. **The essential oil of the Mango flower.** *Sci. & Cult.* 11 (12), 1946 (700). D.S.I.R.

[2037]. 34.26 : 12.26–8 : 21. ENGELBEEN, M. Les Aleurites. [**The *Aleurites*.**] *Bull. agric. Congo belge* 37 (2), 1946 (255–342). [F.]

A comprehensive account of the genus; its habitat and acclimatization; silvicultural characters and requirements; propagation; formation of plantations; harvesting, husking and drying the fruit; extraction and nature of oils; commerce, prices, etc.; *A. fordii* and *A. montana* in the Belgian Congo.

[2038]. 34.26 : 12.26–8 (7). LUNDELL, C. L. **The genus *Garcia* Vahl, a potential source of superior hard quick-drying oil.** *Wrightia* 1 (1), 1945 (1–12). L.S.

The genus *Garcia*, closely related to *Aleurites*, contains two species native to Mexico, *G. nutans* and *G. parviflora*. The oil of *G. nutans* has characteristics and physical properties similar to those of Tung oil. In some ways it appears to be equal, if not superior, to the best Tung oil of commerce; but pilot-plant tests are necessary to demonstrate that *Garcia* oil is valuable commercially.

The known wild stands of *G. nutans* have a potential production of not more than 10 long tons of seeds annually. Initial estimates, based upon a study of wild trees under competitive forest conditions, indicate a low yield. However, through cultivation it should be possible substantially to increase the seed production per acre. The tree is widely adapted to the lowlands of tropical America. *From author's summary.*

[2039]. 34.26 : 12.26–8 : 12.11.11. PUNTAMBEKAR, S. V. **The fatty oil from the seeds of *Mallotus philippinensis*, Muel.** *J. Indian chem. Soc.* 11 (12), 1942 (464–5). L.S.

A comparison of the results of analyses of oil from the seeds of *Mallotus philippinensis* extracted with petroleum ether and with benzene respectively.

[2040]. 34.26 : 12.26–8 : 12.11.11. PUNTAMBEKAR, S. V., and KRISHNA, S. **The fatty oil from the seeds of *Bauhinia variegata* Linn.** *J. Indian chem. Soc.* 17 (2), 1940 (96–100). L.S.

[2041]. 34.26 : 12.26–8 : 12.11.11. CHILD, R., and NATHANAEL, W. R. N. **On the fatty acids of Margosa (Neem) oil.** *J. Indian chem. Soc.* 21 (1), 1944 (35–7). L.S.

[2042]. 34.26 : 12.29 (81). KNAGGS, N. S. **Carnaúba—Brazil's tree of life.** *Chem. Engng. News* 22 (18), 1944 (1564–9). D.S.I.R.

An account of *Copernicia cerifera* and its products. It grows throughout Northeastern Brazil, and produces a maximum of wax at 50 to 60 years. The fronds are collected for wax production 3 or 4 months after the end of the rainy season. About 100 fronds produce 1 lb. of wax, each tree yielding an average of 6 oz. per year. About 35 to 40 million trees are worked annually, producing between 11,000 and 12,000 tons of wax, most of which is exported to the U.S. in 6 grades. The light yellow grades come from the new fronds and contain fewer impurities than the darker ones. During drought the palm reaches its greatest productivity in wax.

The shoots can be used for cattle-fodder or as a green vegetable or salad. The seed of the fruit, which is edible, is crushed for cooking oil and the shell is roasted for making a beverage. The pith can be used to make a food like farina, and the ashes of the burnt wood yield an alkali for soap-making. The wood is hard and impervious to insects and sea-water, and is used to build native houses. Fronds are used for thatching and broom-making, and the frond fibres for high-grade paper and weaving mats, baskets, etc.

The wax has a high melting-point, is hard, and is compatible with many chemicals. It is used mainly for surface-finishing and polishing

and for making a high-grade carbon paper. The analysis of carnaúba wax is as follows:— Cerotic acid, myricyl ester, myricyl alcohol ($C_{29}H_{62}O$), ceryl alcohol ($C_{27}H_{56}O$, melting-point 76° C., small amount), melissyl alcohol ($C_{30}H_{62}O$), unknown glycol ($C_{25}H_{52}O_2$) of uncertain formula. Phytosterin 0·5 per cent., and a hydrocarbon, melting-point 59° C. Total hydrocarbons and alcohol, 54 to 55 per cent., fatty acids 41 to 48 per cent., chiefly carnaúbic acid ($C_{23}H_{47}COOH$), melting-point 72·5° C.; small amount of cerotic acid ($C_{26}H_{53}COOH$), myricic acid, and an unknown hydroxy acid ($C_{21}H_{42}O_3$).

[2043]. 34.26 : 12.29 : 2. Gomes, P. **A carnaubeira.** [*Copernicia cerifera.*] Serviço de Documentação, Ministério da Agricultura, Rio de Janeiro. *S.D.A.* 220, 1945. pp. 62 + plates. [Port.]

Includes a botanical description of the species and notes on habitat, climatic and soil requirements, nursery practice, cultural treatment, properties and uses of the wax.

[2044]. 34.26 : 12.26–8 : 12.11.1. Curtis, J. T., Duncan, R. E., and Blondeau, R. **Non-latex rubber in *Cryptostegia*.** *Amer. J. Bot.* 33 (6), 1946 (578). [Univ. of Wisconsin, Madison 6, Wis.] O.B.D.

Globules similar in appearance and in staining and solubility reactions to those described by Whittenberger and Kelner (*Amer. J. Bot.* 32, 1945 (619–27)) were found in the leaves, old trunks and roots of *Cryptostegia grandiflora*. These inclusions appear to be correlated with the age of the cells and not with the presence of chloroplasts, as they are absent from young chlorenchyma and ray parenchyma but present in old cells of both types. The authors do not believe that the mere presence of organized globules of rubber in leaf chlorenchyma is evidence that such globules act as temporary storage centres for rubber which is later digested and translocated in a manner analogous to sugar-starch transformation.

[2045]. 34.26 : 12.26–8. Horn, E. F. **Another rubber-producing Euphorbiaceae.** *Trop. Woods* No. 86, 1946 (13–4).

Tests made by the Bureau of Standards in Washington, D.C., indicate that certain species of *Sapium* native to the Amazon basin yield a rubber that is stronger and more elastic than *Hevea* rubber. *Sapium* rubber resisted a rupture load of 3,600 lb. per sq. in. and a maximum stretching load of 750 per cent. as compared with 2,940 lb. per sq. in. and 660 per cent. for *Hevea* rubber. The Instituto Agronomico do Norte at Belém, Para, is studying the economic possibilities of this new rubber-producing plant.

[2046]. 34.26 : 12.26–8. Carvalho, L. de. A '*Hypocratea-ovata*', nova fonte de guta. [***Hippocratea ovata*, a new source of rubber.**] Serviço de Informação Agrícola, Ministério da Agricultura, Rio de Janeiro. 1941. pp. 5. [Port.] *Separate* of *An. 3° Congr. Sul-Amer. Quím.* (9ª *Secc.*). [Instituto Nacional de Tecnologia, Rio de Janeiro.]

Notes on the botanical characters of *Hippocratea ovata*, its geographical distribution and habitat, the rubber content of root, stem, and leaves, and the possibilities of the use of the plant commercially as a source of rubber and gutta percha. The percentage of plastic material extracted with benzol was 10·8 from the roots; 5·4 from the stem; and 1·7 from the leaves.

[2047]. 34.26 : 12.26–8. Krishnamurthy, C. R., Jagannathan, V., and Subrahmanyan, V. **Preparation of a highly active vegetable rennet from *Ficus carica* Linn.** *J. sci. industr. Res., India* 4 (11), 1946 (720). I.H.

The milk-clotting enzyme from the latex of *Ficus carica* was prepared by direct drying, salting out, or solvent precipitation, after removal of suspended matter by filtration or centrifuging. 1 cc. of the latex yields 0·12 to 0·15 gram of dry powder which retains 90–95 per cent. of the activity originally present in the latex. The activity of the latex depends on environmental factors, but, even allowing for this, enzyme preparations of quite high activity can be obtained. At the optimum temperature of 76° C. and with addition of about 600 mg. of calcium lactate per pound of milk, the enzyme is capable of clotting 1,000,000 times its own weight of fresh cow's milk in one minute. Yield of latex per plant is 30–50 cc. at a time under local conditions, the yield being highest in early morning.

[2048]. 34.26 : 12.26–8 : 60.31.2. Cope, J. A. **The silviculture of the sugar bush.** *J. For.* 44 (9), 1946 (647–9). [Department of Forestry, Cornell Univ., Ithaca, N.Y.]

The proper development and management

of a stand of Sugar Maple call for strict exclusion of grazing stock and the gradual elimination of all species except Sugar Maple. A stand of 50 stems per acre in the upper crown levels, supporting 150 or more sap buckets, is set up as the goal of management. The 15-year records of two sample areas in New York State indicate that this can be achieved in either an even-aged or an uneven-aged stand, but it is believed that the latter is to be preferred since such a stand can more easily be maintained at a continuously high level of sap production, without at the same time building up the volume above 40–45 cords per acre. *From author's summary.*

34.27. Seeds. Fruits. Leaf Fodder. Fibres and Flosses

[2049]. 34.27 : 12.26–8 : 12.11.11. GHOSE, T. P., KRISHNA, S., and SURYAPRAKASA RAO, P. **Tamarind-seed pectin.** *J. sci. industr. Res., India* 4 (11), 1946 (705–10). I.H.

The Tamarind-seed pectin, unlike the fruit pectins, is essentially a polysaccharide, producing xylose, glucose and galactose on complete hydrolysis with dilute sulphuric acid. On oxidation with nitric acid it yields mucic and saccharic acids. Even the purest sample of the pectin so far obtained contains a small amount of nitrogen and phosphorus.

[2050]. 34.27 : 12.26–8 : 12.11.11. JONES, M. A., and PLANK, H. K. **Chemical nature of the insecticidal principle in Mamey seed.** *J. Amer. chem. Soc.* 67 (12), 1945 (2266–7). D.S.I.R.

The toxic fraction of ground dry seeds of *Mammea americana* was isolated and investigated. The preliminary results are given.

[2051]. 34.27 : 12.26–8. REES, W. H. **The over-all specific volume of kapok.** *J. Text. Inst., Manchr.* 37 (5), 1946 (T121–T139). P.R.

Samples of kapok of various kinds were examined to determine some of the measurable characters of the fibres. Diameter, fibre weight per unit length, over-all specific volume of single fibres, and buoyancy of single fibres were calculated. The over-all specific volume of a mass of kapok fibres at pressures of 0·5 and 1 lb. per sq. in. was also determined, because this pressure range corresponds roughly to the specific volume of kapok packages used in flotation equipment. The effects of the pressure, temperature and humidity history of the sample on its volume were studied. The volume recovery after compression to densities of about 10 lb. per cu. ft. and over was slow under ordinary conditions but was accelerated by increased temperature and humidity. The specific volume of kapok compressed under high pressure and then opened out by hand-teasing is lower than that of kapok of the same type which has not been subjected to high pressure. This is because the hollow, cylindrical fibre is flattened by the pressure and only recovers its form under the influence of high humidity or high temperature and humidity. Experiments with life jackets filled with kapok fibre confirmed this explanation of buoyancy. *From author's summary.*

35. SALE AND DISPOSAL OF FOREST PRODUCTS. TIMBER TRADE

[2052]. 35 (71) : 09.4. LECLAIR, W. J. **Lumber production in Canada.** *Timber of Canada* 7 (1), 1946 (61–4).

It is estimated that the total accessible saw timber in Canada amounts to 250,250 million bd. ft. of which Spruce and Balsam constitute 104,360, Douglas Fir 23,975, White and Red Pine 9,240, Jack and Lodgepole Pine 18,860, Cedar 26,070, and hardwoods 36,220 million bd. ft. This available saw timber is distributed as follows: Ontario, Quebec and Maritimes 125,005 million bd. ft., Prairies 15,505 million bd. ft., and British Columbia 109,740 million bd. ft. Depletion is at the rate of about 3,000 million cu. ft., of which 80 per cent. is utilized and 20 per cent. lost through fire, insect attack and disease. Fire losses have been much reduced in recent years, but some 500 million cu. ft. of timber are destroyed annually by insects and fungi. About 45 per cent. of production has been from British Columbia in recent years, but owing to shortages of manpower and rising costs, production in that province shows signs of falling off. In the East, on the other hand, owing to the increase in the number of small sawmills, production has risen about 40 per cent. during the war, but wages have risen very rapidly, labour is short, and controlled prices of lumber low, and the industry is enjoying an artificial prosperity from the high prices for exports due to the present world shortage of timber. The writer urges the need of more mechanization of logging

operations, improved machinery in mills, more use of kiln-drying, and closer utilization.

[2053]. 35 (71.5–6). FELLOWS, E. S. **Some changes in the lumber industry of the Maritimes.** *For. Chron.* 22 (3), 1946 (172–81).

Observations based on a comparison of conditions in the years 1917 and 1937 in the Maritime Provinces (Nova Scotia and New Brunswick) and the rest of Canada, shows that the productive efficiency of the industry is decreasing. Human labour at low wage rates is being substituted for steam, oil, electricity and modern machinery, following a policy of high wage costs at low wage rates in preference to higher capital costs and wages. Suggested remedies include the establishment of more large, permanent sawmills and of a central distributive agency.

[2054]. 35 (82) : 98.3. Las perspectivas postbelicas de la industria maderera argentina. [**The postwar prospects of the Argentine timber industry.**] *Mundo maderero* 6 (71), 1946 (5–8). [Span.]

An account of Argentine consumption of saw timber, cabinet woods, plywood and veneers in recent years and the extent to which foreign imports have been replaced, or are capable of replacement, by home supplies. During the war, imports of wood for furniture, cabinet-making and carpentry fell to about 20 per cent. of their normal volume. In 1943, imports of plywood amounted to some 3 million pesos, or about half the total imports of timber. The plywood industry in Argentina is young and satisfies only 30 per cent. of local needs. Prospects of successful competition with imported grades are poor.

[2055]. 35 (94) : 06.1. CORSON, T. **Australian timber industry collaboration.** *Emp. For. Rev.* 25 (1), 1946 (47–8).

A brief account of the Eastern States Timber Industry Stabilization Conference, which consists of representatives of the Forestry Commissions and the sawmilling industries of New South Wales, Queensland, Victoria and Tasmania. The most interesting achievement of these conferences is that of getting unanimous agreement to the system of stumpage appraisal in place of the old systems of fixed royalty or tender. As applied in New South Wales, the appraisal system gives a fair margin to all parties within the framework of market prices. Costings are based on award rates of wages, agreed capital and maintenance charges, and an agreed profit margin.

[2056]. 35 (97 : 410) : 31 : 33. CHANDLER, S. E. L'utilisation dans le royaume-uni des bois tropicaux et subtropicaux Britanniques. [**The utilization of tropical and subtropical Empire timbers in the United Kingdom.**] *Rev. int. Bois* 13 (109/110), 1946 (126–30). [F.]

[2057]. 35 : 98.2. BEVANS, A. **World timber situation.** *Aust. Timb. J.* 12 (6), 1946 (315, 318).

The writer concludes that the world shortage of timber will last for at least 3 years, but that requirements and supplies of pulpwood should soon reach a balance. Production of pulpwood in the Far Eastern Soviet Republics may become an important factor in supplying the huge potential markets of the Far East and Pacific areas.

38. FOREST CONSTRUCTIONAL WORKS. ENGINEERING

38.2. *Building Construction. Foundations and Superstructures*

[2058]. 38.2. CAMPREDON, J. Les bois de construction. [**Building timbers.**] *Tech. et Archit., Paris* 2 (7/8), 1942 (245–81). [F.] P.R.

A summary of the main facts concerned in designing and erecting timber frameworks. A large number of types of timber construction are described and explained, and numerous illustrations are given.

[2059]. 38.2. CAMPREDON, J. Idées nouvelles en matière de charpente. [**New ideas in timber-work.**] *Rev. Bois Appl.* 1 (3), 1946 (11–4). [F.] P.R.

A description of various types of trellised roof construction. These are frameworks designed to eliminate the use of heavy beams and rafters and to distribute the load of the roof evenly over the walls.

[2060]. 38.2. **Good practice in timber frame construction.** *Aust. Timb. J.* 12 (6), 1946 (323). [Timber Development Association (S. Aust. Branch).]

[2061]. 38.2. **Some home builders save 400 feet of lumber per house with new rafter.** *B.C. Lumberm.* 30 (8), 1946 (86–7).

Description of a new type of trussed rafter designed by the Timber Engineering Co., which can be fabricated with a minimum of equipment. It is claimed that rafters for a 4-roomed house can be assembled by two men in one hour with a saving of 400 ft. of lumber compared with the usual type of rafter.

[2062]. 38.2 : 33.15.2. CAMPBELL, C. C. **Invisible tape joints.** *Veneers & Plyw.* 40 (5), 1946 (10–3). P.R.

Joints in plywood interior panelling which is to be painted or papered are closed by an adhesive tape, which successfully prevents irregularities caused by contraction.

[2063]. 38.2 : 33.4 (71.4). SMITH, J. Une nouvelle industrie dans la Province. [**A new industry in the Province.**] *For. québec.* 11 (6), 1946 (463–6). [F.]

A short account of the recent establishment in Quebec of an industry for the manufacture of prefabricated houses.

[2064]. 38.2 : 33.4. NEVARD, E. H. **Use of timber in building.** *Timber of Canada* 6 (12), 1946 (39–42). [Forest Products Research Laboratory, Princes Risborough, Aylesbury, Bucks.]

A brief historical review of the use and disuse of timber in building in Britain.

[2065]. 38.2 : 33.4 (75 : 76). WILLIAMS, W. K. **Farm buildings from home-grown timber in the South.** *Fmrs.' Bull. U.S. Dep. Agric.* No. 1975, 1945. pp. 18.

A bulletin intended to encourage farmers to make use of their own timber for building farm houses, cottages, barns, etc. Practical hints are given on management of the woodlot, felling, sawing, drying, etc. and a list is given of the uses of Southern woods.

[2066]. 38.2 (43.1–5). ADAMSON, E. K., DAVIES, R. L., LOEWY, E., MASON, J., THOMAS, M. H., and WHITE, E. **The German building industry.** *Final Rep. Brit. Intell. Obj. Sub-comm.* No. 575, Item No. 22, 1946. pp. 143. P.R.

The report contains a section on German research on constructional timber. Important work was done on stress grading and allowable stresses, moisture-content and drying, jointing methods (particularly nailing), and the testing and development of structural forms. Brief indications are given of the lines the research has taken, with a list of documents, research institutions and personalities. Further investigations are recommended.

[2067]. 38.2 : 33.4 : 07.2 (43.1–5) : 33.15.1. LISKA, J. A., and GOTTSCHALK, F. W. **Wood structural research and development.** *FIAT Final Rep. Brit. Intell. Obj. Sub-comm.* No. 225, 1945. pp. 96.

Various German institutions known to have carried out research on the properties of woods and their uses in building were visited. At the Institute for Building Research and the Testing of Building Materials at Stuttgart, and at the Kubler Company, Stuttgart a nailed wooden girder of the 'I' beam type had been developed and was considered to be of interest. A design for a prefabricated house evolved at the Stuttgart Institute for Building Research, is also reported and illustrated. At the Blomberger Holzindustrie at Blomberg-Lippe a type of laminated wood was manufactured from Beech veneers bonded with Tego film. Various methods of manufacturing this laminate were used and it provided a wide range of material with varied uses. Appendices, consisting of documents from the Institute of Building Research at Stuttgart and the Timber Research Laboratory at Hohenschwangen, give lists of publications issued by these bodies with some summaries of reports and projects.

[2068]. 38.2 : 33.4 : 12.25. **Western Pine glued-cleat sheathing panels.** Western Pine Association, Portland, Oregon. No. LN20a [*n.d.*] pp. 2. P.R.

Details are given of the construction and performance of a new type of panel for sheathing and sub-floors, designed by the Western Pine Association.

38.3. *Road and Bridge Construction*

[2069]. 38.3 (494). HÜBNER, F. Les ponts en bois de la Suisse. [**Switzerland's wooden bridges.**] *Rev. Bois Appl.* 1 (5), 1946 (3–8). [F.] P.R.

[2070]. 38.3 : 33.15.2. **Mississippi builds bridge with composite deck.** *Wood Pres. News* 24 (6), 1946 (56–9). P.R.

A description of a 322-ft. concrete and timber bridge near Meridian, Miss., U.S.A., which has a deck consisting of a creosoted plank laminated base, topped by a 5 in. concrete mat, the two materials being integrally connected to transmit shear.

4. FOREST INJURIES AND PROTECTION

[2071]. 4 (410). **Protection.** *Tech. Notes For. Comm., Lond.* Sect. IV, 1946. pp. 38.

These notes have been written primarily for the information of the staff of the Forestry Commission, and are designed more especially to refresh the technical knowledge of men returning from the Forces or from timber supply work. There are chapters on fire protection, and protection against insect pests, fungal diseases, and other causes of damage.

42. INJURIES FROM INORGANIC AGENCIES, EXCLUDING FIRE

42.2. *Temperature Influences*

[2072]. 42.21 (945). Bond, R. W. **Frost damage to Victorian mountain forest areas.** *Aust. For.* 9 (2), 1945 (21–5).

A succession of unusually severe frosts in June-August, 1944, caused the death of considerable patches of *Eucalyptus* regeneration in the burnt areas of Victorian forests at elevations over 3,000 ft. It is suggested that *Prostanthera lasianthos* might be used as a nurse to *Eucalyptus* on such sites; it appears to be very frost-hardy, does not develop a dense shade, and is usually rather short-lived in comparison with any forest crop species. Infrequent, very severe frosts are probably the limiting factor which restricts *E. regnans* to altitudes below 3,500 ft. in Victoria. Above that level, *E. gigantea*, *E. nitens*, *E. gunnii* and *E. coriacea* var. *alpina*, in that order, are the dominant species.

[2073]. 42.21 : 11.11.2 (410). Day, W. R., and Peace, T. R. **Spring frosts, with special reference to the frosts of May 1935.** *Bull. For. Comm., Lond.* No. 18 (2nd ed.), 1946. pp. 111 + plates.

Experience during the 9 years since this bulletin was first published has fully confirmed the importance of frost as a cause of disease in trees in Britain. The exotic conifers have continued to provide the more extreme examples of susceptibility among species of economic importance. The inspection of plantations has, also, continued to reveal the importance of topographical position as a factor determining severity of injury. Further information is now available on the conditions under which low night temperatures develop, and the influence of the soil-cover type on them. The importance of the stage of development of the species at the time of freezing has been confirmed. Fresh evidence is available on the formation of frost pockets in afforested country. The importance of genetical constitution in determining resistance to frost injury was suggested many times, after the May frost in 1935, by the variability in degree of injury among individuals of one species growing in similar situations. It was particularly obvious with early- and late-flushing Norway Spruce and the various strains of Larch. Experimental plots of European Larch in England and Wales, containing strains of different provenance, confirm the relative resistance to frost injury shown by strains of Scottish provenance as compared with those obtained from the Continent. Alpine races of Swiss and Italian origin have proved to be most susceptible. Evidence has accumulated which stresses the importance of frost injury as a cause of canker on Poplars. Clear instances of frost canker have occurred on *Populus robusta*, *P. serotina*, *P. eugenei*, and *P. candicans*. In some cases serious die-back also occurred. It is strongly suggested that, at least in some cases, pathological developments of this type, which have in the past often been ascribed solely to parasitic action by either fungi or bacteria, are initiated by frost injury even though a parasite may be necessary for the continued and characteristic development of the disease. The die-back and canker of European Larch is to be regarded in this light, as a disease in which frost is the primary cause of injury, the fungus acting as a secondary factor which stimulates frost susceptibility. Corsican Pine also is subject to serious die-back owing to frost injury. *From authors' introduction.*

[2074]. 42.21 : 12.26–8. Holdheide, W. Über Kambialfrostschäden an Edelkastanien und Eschen. **[Cambial frost injuries in Spanish Chestnut and Ash.]** *Thar. forstl. Jb.* 91, 1940 (582–90). [G.] [Forstbotanisches Institut Tharandt.]

[2075]. 42.21 : 12.26–8 : 12.14.5 : 12.11.14. Lemée, G. Modifications de la morphologie et de l'économie hydrique des feuilles de *Fagus*

silvatica par l'action d'une période de gel au cours de la feuillaison. [**Modifications in the morphology and hydrological régime of leaves of *Fagus sylvatica* caused by a period of frost during leaf growth.**] *C. R. Acad. Sci., Paris* 222 (8), 1946 (451–3). [F.] D.S.I.R.

After a period of frost during their unfolding, sun leaves of *Fagus sylvatica* showed the following modifications:—Growth had become unequal, resulting in irregular, almost lobed edges. The differentiation of the tissues had been inhibited. A hypertrophy had set in which had influenced the volume of the cells but not their number, and which varied according to the tissue. This hypertrophy was counterbalanced by a reduction in cell-division in the surface of the leaf-blade, resulting in a smaller leaf-surface. Water-content at saturation point was higher in relation to the cell-volume than in normal sun leaves, and the rate of transpiration was also higher; the maximum rate of transpiration in the abnormal leaves was more than double that of normal leaves in the same position.

[2076]. 42.21 : 42.1 : 11.2 : 12.19. DAY, W. R. **Ecology and the study of climate.** *Nature, Lond.* 157 (3999), 1946 (827–9).

A report of 5 papers read at a joint meeting of the Royal Meteorological Society and the British Ecological Society held in May 1946: 'Variations in the length of the frost-free period' by G. Manley; 'Local climatic effects in tree growth' by W. R. Day; 'Some factors in micro-climatology' by D. Brunt; 'Climate within a tropical rain forest' by G. C. Evans and P. W. Richards; and 'The effect of climate on the distribution of plant diseases in the Sudan' by A. S. Boughey.

Day's paper deals with frost and exposure to wind. Frost-tender trees in Britain are species whose growth-cycle is markedly out of phase with the annual seasonal cycle; and species which naturally regenerate under an established canopy but which are planted for economic purposes in exposed areas. The topographical situation, elevation above sea level, and the form and density of the vegetative cover are important factors in determining the severity of frost injury. Damage tends to increase after planting until the thicket stage has been reached, but later, when a high canopy has been formed, it may decrease appreciably.

Generally, height growth tends to decrease as intensity of exposure to wind increases, but in this connexion many anomalies have been observed. A quantitative estimate of the relative effects of exposure and other environmental factors such as soil fertility is at present impossible since exposure is not estimated quantitatively.

42.3. *Precipitations*

[2077]. 42.32 : 12.25 : 44.3. FABRICIUS, L. Forstliche Versuche: XXV. Gipfelbruch und Stammfäule in Fichtenbeständen. [**Forestry experiments: XXV. Top breakage and stem rot in Spruce stands.**] *Forstwiss. Cbl.* 62 (12), 1940 (262–6). [G.] Cf. *For. Abstr.* 4 (124).

42.5. *Chemical Influences. Nutrient Deficiencies*

[2078]. 42.5 : 12.14.5 : 11.49.2 (76.6). HARPER, H. J. **Effect of chloride on physical appearance and chemical composition of leaves on Pecans and other native Oklahoma trees.** *Tech. Bull. Okla. agric. Exp. Sta.* No. T–23, 1946. pp. 30.

Investigations were carried out in several areas of bottomland in east central Oklahoma over a five-year period to discover a less laborious method than soil sampling for determining chloride injury to trees caused by the seepage of salt water from storage pits in the vicinity of oil fields. The chloride content of tree leaves collected in late August or early September shows whether the soil contains enough chloride to interfere with normal growth. However, factors other than chloride (such as silting, drought, insects, and plant disease) must also be considered in determining the cause of injury. Pecan, Elm and Hickory appear to be more susceptible to chloride injury than are Burr Oak, Chittamwood, and Green Ash. Data are given on the chloride and total ash content of normal and scorched leaves of various tree species. The harmful effect of sodium in a soil can be gradually eliminated by the addition of finely pulverized gypsum and organic matter.

[2079]. 42.5 : 12.25 : 21.32. NĚMEC, A. Über Ernährungsstörungen eines absterbenden Tannenbestandes. [**On nutritional disturbances in a dying Silver Fir stand.**] *Forstwiss. Cbl.* 62 (10; 11), 1940 (213–21; 245–53). [G.] Cf. *For. Abstr.* 3 (158).

43. FOREST FIRES

[2080]. 43 (73) : 09.4. **Effectiveness of forest protection in organized forest areas.** American Forest Products Industries, 1319 18th St., N.W., Washington 6, D.C. [1945?] pp. 8.

A series of charts illustrating the number of forest fires, area burned and size of fires on protected lands in the U.S. during 1944.

43.0. *Predisposing Factors and Causes*

[2081]. 43.01 : 07.7. MACQUEEN, I. C. **Fire weather instruments: their adjustment and use.** British Columbia Forest Service, Victoria, B.C. T.28, 1946. pp. 12 + app.

It is often found that fire weather instruments are so badly out of adjustment or so incorrectly used that the results are inaccurate and dangerously misleading. This bulletin gives directions for the proper care, adjustment and reading of the instruments commonly in use, i.e. sling psychrometer, fan psychrometer, humidiguide, hygrometer, hygrograph, fuel moisture stick balance and rain gauge.

43.1. *Protective Measures*

[2082]. 43.1 HOWIE, E. L. **Forest fire fighters' guide.** *Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 833 (F–3), 1946. pp. 52.

A small ready-reference book for the fire-fighter, with sections on prevention, detection, forest fire weather, suppression plans, forest fire fighting, factors influencing fire behaviour, plan of attack, motor pumps, fire-line construction. There are tables showing rations for one man for one day and 100 men for one day, cooking and mess equipment for various sized crews, first-aid equipment and the weight of items in a fire-pump unit.

[2083]. 43.1 (73) : 07.7. ROWLAND, C. A. **Adapting army equipment to forest-fire fighting.** *Mech. Engng., N.Y.* 67 (7), 1945 (437–41). L.S.

[2084]. 43.1 : 06.6. ORELL, B. L. **Fire education—does it pay?** *J. For.* 44 (9), 1946 (666–7).

Experience at Camp Adair, Oregon during the fire seasons of 1943 and 1945 made possible some degree of measurement and gives some indication of the value of a concentrated fire-education programme. In the former year, an intensive educational drive was launched among the 40,000 troops stationed in this highly inflammable area. In 1945, instead of 40,000 troops stationed for a minimum period of 9 months, the camp population varied from 20,000 to 5,000 with an average stay of 10 days, so that effective fire-education was impossible. Lack of such training in 1945 caused a 48-per-cent. increase in the proportion of carelessly caused fires.

[2085]. 43.12. EUBANKS, W. B. **Ten-second fire location.** *J. For.* 44 (10), 1946 (727–30).

The writer describes a method of locating fires, up to a distance of 15 miles, by the use of vertical angles, and gives detailed instructions for the construction of the necessary equipment, which, it is claimed, can be constructed in 35–40 man hours from materials costing about 75 cents, and by the use of which fires can be accurately located in a few seconds.

[2086]. 43.12. MORRIS, W. G. **A preliminary survey of factors of visibility of small smokes in aerial detection.** *Fire Control Notes* 7 (2), 1946 (22–5).

Tests were made at Chelan National Forest in September 1945 on aerial detection of small smokes. The two most important factors are brightness or colour of background and angle between the lines of sight from the observer to the smoke and from the observer to the sun. Visibility of white smoke in full sunlight against dark background decreases gradually as this angle increases. Against a mottled background, visibility is about the same as against a dark one for angles of 0°–70° from the sun, but decreases rapidly as the angle increases beyond 70°. Against a light background the visibility is less, and the optimum angle from the sun is about 40°; from this optimum, the visibility decreases rapidly as the angle increases. This greater visibility of smoke looking towards the sun, applies only to smoke in full sunlight. For all practical purposes the safe visibility distance of smokes in shadow when looking towards the sun is zero. When looking away from the sun, the visibility is better, but is still considerably less than if the smoke were in sunlight instead of in shadow. When looking away from the sun, smoke can be seen farther on a cloudy day than on a clear day, especially if looking towards a light background. On a clear day, the visibility is greatest when looking towards the sun,

unless the smoke is in shadow. On a cloudy day the visibility distance when looking away from the sun is the same as when looking towards the sun.

[2087]. 43.13 : 07.7. WEST, J. W., and FARMER, L. J. **Fighting fire with fog.** *Fire Control Notes* 7 (2), 1946 (41–4).

Notes on a new grass and brush fire-fighting machine developed in the U.S. Region 5 and tested at Wasatch National Forest. Work is in progress on an improved model.

[2088]. 43.13 : 07.7 (47.). NESTEROV, V. G. Novÿe mekhanizmÿ dlya tusheniya lesnÿkh pozharov. [**New machines for forest fire suppression.**] *Trud. vsesoyuz. nauchno-issledov. Inst. lesnogo Khoz.* No. 12, 1940 (169–91). [Russ.]

About 700,000 ha. of forest is annually destroyed by fire in the R.S.F.S.R. alone, worth about 3 million roubles, and a good deal of research has been done on fire-fighting equipment and methods. The present article gives a brief account of: (*a*) a tractor-drawn fire-line sprayer; (*b*) two types of one-horse sprayers; (*c*) a haversack sprayer; (*d*) apparatus for hand dusting; (*e*) a two-man motor-cycle combination with fire-fighting implements; (*f*) a horse-drawn, hand fire pump; (*g*) a shrub-cutting dozer and two types of plough for making fire lines.

43.3. *Fire Damage*

[2089]. 43.3 (71.4) : 09.4. QUEBEC. **Report of the Minister of Lands and Forests of the Province of Quebec for the year ending March 31st, 1944.** King's Printer, Quebec. 1945. pp. 157.

Statistics are given of number and cause of forest fires, area burnt and value of damage during the 20 years 1924–43. The numbers of fires recorded has increased but on the whole the total area burnt has remained about the same except in the great conflagrations of 1932 and 1941. It is estimated that 93·5 per cent. of the fires registered in the last 20 years were caused by human agency (pp. 59–60).

44. DAMAGE BY HARMFUL PLANTS. VIRUS DISEASES

[2090]. 44 (82). MARCHIONATTO, J. B. Reseña de la sanidad vegetal en la Republica Argentina. [**Review of plant sanitation in the Argentine Republic.**] Facultad de Agronomia y Veterinaria, Universidad de Buenos Aires. 1946. pp. 117. [Span. span.e. port.]

The booklet is divided into 4 parts: (1) historical survey; (2) plant pathology and the Ministry of Agriculture; (3) organization of the official services dealing with plant health; and (4) advances made in study of plant disease.

[2091]. 44 : 12.11. GÄUMANN, E. Pflanzliche Infektionslehre: Lehrbuch der allgemeinen Pflanzenpathologie für Biologen, Landwirte, Förster und Pflanzenzüchter. [**The theory of plant infection: a textbook of general plant pathology for biologists, agriculturists, foresters and plant breeders.**] Verlag Birkhäuser, Basel. 1946. pp. 611. [G.] (*Lehrbücher und Monographien aus dem Gebiete der exakten Wissenschaften. 3. Reihe der experimentellen Biologie* Band I.) Price Fr. 48.50.

This book, the fruit of 20 years' lecturing at the Swiss Federal Technical College at Zürich, is a comprehensive treatment of the principles of plant infection, i.e. of the fundamental biological aspects of disease. It is not concerned primarily with special pathology, i.e. individual diseases as such, though it contains a wealth of examples (including virus diseases and parasitic phanerogams such as *Viscum*) selected, to illustrate the principles involved, from disorders due to parasites in many types of plants, including trees. A good deal of attention is also paid to clarification of terminology. The scope of the work is shown by the following summary of contents: Chap 1. *Infection* (pp. 89): mechanism; environmental factors; periods of infection, incubation and fructification; numerical threshold of infection; mode of infection; colonization of the host. Chap. 2. *Chains of infection* (pp. 107): nature of chains of infection; sources of infection; transfer of the pathogenic agent; epidemiology of infective plant diseases. Chap. 3. *Capacity for parasitism of the agent* (pp. 82): hereditary, constitutional differences in capacity for parasitism; changes in capacity for parasitism; requisite conditions for the exercise of this capacity. Chap. 4. *The susceptibility of the host to infection* (pp. 222): (*a*) Hereditary—axenia and its material basis; defence reactions; inheritance of susceptibility; (*b*) Changes due to environment. Chap. 5. *Disease as a condition* (pp. 51): general; morphological and anatomical manifestations; physiological manifestations.

Chap. 6. *The control of plant diseases* (pp. 7): exclusion of the possibility of infection; genetic or cultural measures to promote the resistance of the host; therapy.

There is a bibliography of 12 pages of the more recent works on plant disease, and a subject index of 27 pages in which tables and figures are referenced as well as the actual text.

44.3. *Fungi*

[2092]. 44.3 : 12.11. GÄUMANN, E. **Types of defensive reaction in plants.** *Phytopathology* 36 (8), 1946 (624–33). [Department of Botany, Federal Institute of Technology, Zürich, Switzerland.]

Some salient points of view from the author's *Pflanzliche Infektionslehre* (see previous abstract).

Six main types of defensive reaction in plants are briefly described: (1) the plasmatic anti-infectional reactions, most easily traceable in chronic infections, which (*a*) alter and weaken the invading parasite, (*b*) localize the intrusive pathogen, and (*c*) digest and eliminate the intracellular parasites; (2) the necrotic reactions, whereby further development of biotrophic parasites is rendered impossible by the death of the host cells; (3) premunity or infectionary immunity, based on the fact that an organism, or certain of its tissues, cannot be effectually super-infected by the same or by a related pathogen so long as the primary infection persists. (4) histogenic demarcations, whereby an antitoxic barrier is effected by means of the necrotic products of the invaded plant cells; (5) gummous demarcations, whereby the spread of the toxins is localized by exudations of gum which are impassable to them; and (6) induced tolerance, whereby the infected plant effects a desensitization of its own system, so that it no longer reacts to the presence of the pathogenic agent with symptoms of disease, although it continues to carry the disease pathogen, which retains full pathogenicity for other plants.

[2093]. 44.3 : 12.25 : 12.21. **The *Phomopsis* disease of conifers.** *Leafl. For. Comm., Lond.* No. 14 (revised), 1946. pp. 4.

Includes a brief description of the symptoms of *Phomopsis* disease (*P. pseudotsugae* Wilson) on Douglas Fir. Die-back of the leading shoots may seriously damage transplants in the nursery and trees up to about 8 years old. Girdling of the stem often occurs near ground level in trees 6–8 years old and almost always results in death. Cankering of the main stem is found especially on trees 15–20 years old, after thinning and pruning operations. The disease has been found only in trees up to about 25 years old. Methods of prevention are indicated.

[2094]. 44.3 : 12.25 : 12.21 (71). MCCALLUM, A. W. **Control of forest disease through management.** *Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 827 (F–2), 1946. pp. 3.

The paper deals mainly with the management of Balsam Fir. It is recommended that Fir should be cut at about 70 years of age in order to avoid serious loss by decay and by windthrow. The present system of clear-cutting to a diameter limit should be altered to partial cutting at intervals of about 20 years. At the time of these periodic cuttings, unthrifty individuals should be eliminated from the stand. This will result in an accelerated rate of growth in the remaining stand and will substantially increase the yield of sound wood per unit area.

[2095]. 44.3 : 12.25 : 12.21. LOMBARD, F. F., and DAVIDSON, R. W. **An undescribed *Coryneum* on diseased Italian Cypress.** *Phytopathology* 36 (9), 1946 (775–7). [U.S. Bureau of Plant Industry, Beltsville, Md.]

Coryneum asperulum sp. nov., was found on dead terminal buds, leaves, and branchlets of *Cupressus sempervirens* near Montgomery, Alabama. The pathogenicity of the fungus was not investigated.

[2096]. 44.3 : 12.25 : 12.21 (79.7). LONG, W. H. **Notes on four eastern species of *Gymnosporangium*.** *J. Wash. Acad. Sci.* 35 (6), 1945 (182–8). L.S.

A report of investigations conducted by the author in the District of Columbia and vicinity in 1912 and 1913 on the local occurrence of *Gymnosporangium clavipes* Cke. & Pk., *G. nidus-avis* Thaxt., *G. effusum* Kem., and *G. juniperi-virginianae* Sch.; on the lesions produced by them on Eastern Red Cedar (*Juniperus virginiana* L.); and on inoculations with *G. effusum*.

[2097]. 44.3 : 12.25 : 12.21 (485). RENNERFELT, E. Om rotrötan (*Polyporus annosus* Fr.) i Sverige. Dess utbredning och sätt att uppträda. **[On butt rot caused by *Polyporus***

[*Fomes*] ***annosus* in Sweden. Its distribution and mode of occurrence.**] *Medd. SkogsforsknInst.* [*Skogsförsöksanst.*] *Stockh.* 35 (8), 1946. pp. 88. [Sw.g.]

A detailed, up-to-date account of the field and laboratory investigations reported in brief in 1945 [cf. *For. Abstr.* 7 (No. 1407)] with sections on the fungus, course of infection, occurrence and growth of rot in trees, geographical distribution (map), behaviour in culture, occurrence under different environmental conditions and control. Besides points noted from the 1945 report, mention of the following may be made: Scarcely any butt rot occurs in forests on peatland, but it is common in those of the fresh dwarf-shrub type (rather moist site types with *Vaccinia* etc.) and severe attacks have also occurred on permeable and dry soils. Direct correlation between incidence of butt rot and soil pH could not be established, nor has it been possible to find a correlation with particle size of the mineral soil. The fungus occurs on sands, moraine soils and clays: it is common in calcareous regions but sparingly distributed where the bedrock is sandstone and in the North Swedish region of archaic rocks. In culture, Pine needles were excellent as a substratum, whereas Beech litter was poorly assimilated. Humus extracts, even from sites where the fungus was not detected, also gave good growth in culture. Vitamin B_1 is believed to be a limiting factor for growth.

[2098]. 44.3 : 12.25 : 12.21 (71.1) : 31.8 : 52.46. BIER, J. E., and FOSTER, R. E. **The relation of research in forest pathology to the preparation of forest inventories. 2. The possibility of obtaining net volumes by grade when cruising overmature stands of Sitka Spruce on the Queen Charlotte Islands.** *B.C. Lumberm.* 30 (7), 1946 (52–3, 66, 68). [Dominion Laboratory of Forest Pathology, Victoria, B.C.]

It was indicated in a previous article [cf. *For. Abstr.* 8 (No. 1415)] that for satisfactory cruising of overmature Sitka Spruce, it is necessary to have local volume tables with decay deductions for trees in different diameter classes. The present article gives data on the average, gross, and net merchantable volumes by grade of 1,977 trees of Sitka Spruce on the Queen Charlotte Islands. A series of tables shows (1) gross and decay volumes by grade, (2) relation between diameter at which the trees were cut and gross merchantable volume. Trees of the slope type contained appreciably more Grade 1 wood than those of the bench type. More decay occurred in the Grade 3 logs than in the Grade 1 or Grade 2 logs. Cull factors are given for material of different grades. It is felt that pathological investigations of this kind should constitute part of the basic information required for the management of a forest unit.

[2099]. 44.3 : 12.25 : 12.21 (71.1). BIER, J. E., and NOBLES, M. K. **Brown pocket rot of Sitka Spruce.** *Canad. J. Res.* 24C (4), 1946 (115–20). P.R.

A brown pocket rot of Sitka Spruce (*Picea sitchensis*) occurs in stands on the Queen Charlotte Islands, B.C. The decay, the sporophore associated with it, and the cultural characters of the fungus are described. The causal fungus is described as *Lentinus kauffmanii* sp. nov. A. H. Smith. [See *For. Abstr.* Vol. 8 (No. 1416).]

[2100]. 44.3 : 12.25 : 12.21 (469). OLIVEIRA, A. L. FRANCO. Um fungo parasita do *Pinus halepensis*, Miller. **[A parasitic fungus found on *Pinus halepensis*, Miller.]** *Agros, Lisboa* 27 (3/6), 1944 (158–64). [Port.]

Symptoms of a disease of *Pinus halepensis* Miller caused by the wound parasite *Sphaeropsis elisii* Sacc. are described, and notes are given on taxonomy, characteristics, and biology of the fungus. The Pines tested are susceptible to the disease in the following order: *Pinus pinaster* (most susceptible), *P. canariensis*, *P. halepensis*, *P. pinea*, and *P. laricio*. Of the other conifers inoculated (viz. *Thuja orientalis*, *Cupressus lusitanica*, and *Juniperus virginiana*), *Thuja orientalis* showed positive results. The fungus also attacked seasoned wood of *Pinus sylvestris*, *P. pinea*, and *P. pinaster*.

[2101]. 44.3 : 12.25 : 12.21. BOUDRU. La rouille des aiguilles du Thuya géant. **[The leaf cast of *Thuja plicata*.]** *Bull. Soc. for. Belg.* 52 (7/8), 1945 (69–75). [F.]

Keithia thujina Durand has for some years been causing serious mortality to *Thuja* seedlings at Groenendael. This note gives an account of the disease and the morphology and taxonomy of the fungus.

[2102]. 44.3 : 12.26–8 : 23.24 : 24. DILLER, J. D. **The planting and care of blight-resistant Chestnuts for forest trees.** *For. Pathol. spec. Release U.S. Dep. Agric.* No. 15, 1944. pp. 6. Cf. *For. Abstr.* 7 (No. 1142).

[2103]. 44.3 : 12.26–8 : 12.21 : 11.47.13. DILLER, J. D., WHITTAKER, C. W., and ANDERSON, M. S. **Effect of mineral nutrition on the vigor and susceptibility to blight of old Japanese Chestnut trees.** *Phytopathology* 36 (7), 1946 (554–6). [Plant Industry Station, Beltsville, Md.]

Investigations were carried out at Fairfax, Maryland, in 1944–45 into the effects of plant nutrients on 50-year-old *Castanea crenata* and on the incidence of infection and the susceptibility of the trees to the Chestnut blight fungus, *Endothia parasitica*.

Conventional analysis of variance indicated that (1) fertilization with potash and phosphoric acid had no significant effect on shoot growth; (2) nitrogen at the rate of 150 lb. per acre was without significant effect; and (3) nitrogen at the rate of 300 lb. per acre increased shoot growth significantly in 1944, but a second application in 1945 had no significant effect. Under the conditions of the experiment, potash and phosphoric acid applied a year previous to inoculation appeared to increase canker incidence and susceptibility to the canker fungus, but this effect was modified in a complicated manner by treatment with nitrogen.

[2104]. 44.3 : 12.26–8 : 12.21 (74.8). KELLEY, A. P. **The present status of American Chestnut in southeastern Pennsylvania.** Landenberg Laboratory, Landenberg, Pa. 1944. pp. 11.

Observations on the effect of Chestnut blight (*Endothia parasitica*) on the growth of *Castanea dentata* in six plots between 1924 and 1943, indicate that stump sprouts have almost disappeared and old stumps have lost most of their sprouting capacity; but the blight organism has become less common. Recent Chestnut seedlings are vigorous and comparatively slightly affected by blight. Immediate destruction of the limited amount of spore-bearing material now present in the woodlands may result in the re-establishment of *Castanea dentata* as a forest crop.

[2105]. 44.3 : 12.26–8 : 12.21. RUDOLPH, B. A. **Attempts to control bacterial blights of Pear and Walnut with penicillin.** *Phytopathology* 36 (9), 1946 (717–25). [Univ. of California Deciduous Fruit Field Station, San José, California.]

The antibiotic properties of penicillin were tested against the gram-negative organisms, *Erwinia amylovora* (Pear blight) and *Xanthomonas juglandis* (Walnut blight). In conventional plate tests, dilutions of the drug in distilled water at the rate of 100 units per 0·1 ml. inhibited growth of *E. amylovora* in circular areas of 25 mm. diameter, as seen under the microscope, or 35 mm., as seen by the naked eye. At the rate of 10 units per 0·1 ml., the organism was not affected. *X. juglandis* is more susceptible and was inhibited by dilutions of 10 units per 0·1 ml. in circular areas of 20 to 30 mm. diameter, but was not affected by 1 unit per 0·1 ml. Attempts to control either organism *in vivo* failed completely. *From author's summary.*

[2106]. 44.3 : 12.26–8 : 12.21. LEDEBOER, M. S. J. ***Schizophyllum commune* as a wound parasite: a warning to Wattle growers.** *J. S. Afr. For. Ass.* No. 13, 1946 (39–40).

In plantations of *Acacia mollissima*, trees withering at about 3 years old were found to be suffering from a trunk wood rot. In at least 4, *Schizophyllum commune* was isolated from the discoloured wood. Usually the origin of a wood rot can be traced to an old wound. In one of these four instances, the wound was obviously due to frost, in another to pruning. Wattle growers should realize the danger of excessive and often unnecessary pruning of *A. mollissima*. A count of 550 trees in one heavily pruned plantation showed that the average percentage of trees beginning to wilt in the winter was 3·6. From 4 out of 7 samples taken in that plantation, a Hymenomycete has been isolated, of which one has so far proved to be *S. commune*.

[2107]. 44.3 : 12.26–8 : 12.21 (74.9). REX, E. G., and WALTER, J. M. **The canker stain disease of Planetrees, with recommendations for controlling it in New Jersey.** *Circ. N.J. Dep. Agric.* No. 360, 1946. pp. 23.

A popular account of the canker stain disease (*Endoconidiophora* sp.) of London Plane (*Platanus acerifolia*) with simple preventive measures. Pruning should be reduced to a minimum and done between the middle of February and the end of November. Pruning equipment should be disinfected for use on each tree. For wound paint a gilsonite varnish fortified with phenyl mercury nitrate should be used. Diseased trees and pruned branches should be removed from sites where they may infect other trees.

[2108]. 44.3 : 12.26–8 : 12.21 (8). JENKINS, A. E. **Scab of *Cinchona* in South America caused by *Elsinoë*.** *J. Wash. Acad. Sci.* 35 (11), 1945 (344–52). [U.S. Bureau of Plant Industry.] L.S.

The disease referred to as 'scab of Cinchona' is due to a new species of fungus, *Elsinoë cinchonae*, found on leaves, stems and fruits of *Cinchona pubescens* (rarely on *C. officinalis*) in Colombia, Peru, and possibly Ecuador, and on *C. delessertiana* in Peru. The symptoms of the disease (leaf spot, stem cankers, capsule lesions) are discussed and the causal fungus is described. Photographic illustrations of diseased tissues are included.

[2109]. 44.3 : 12.26–8 : 12.21 (492 : 12.11.3 : 12.11.22. HOLLAND. Verslag van de onderzoekingen over het iepenziekte, verricht op het Phytopathologisch Laboratorium 'Willie Commelin Scholten' te Baarn, gedurende 1939. **[Report on Dutch Elm disease research at the 'Willie Commelin Scholten' Phytopathological Laboratory, Baarn, 1939.**—(Also corresponding reports for 1940, 1941, 1942 and 1943).] H. Veenman & Zonen, Wageningen 1941–44. pp. 22; 8; 10; 14; 14. [Du.] *Reprs.* from *Mededeelingen* Nos. 34, 36, 38, 39 and 40 van het Comité inzake bestudeering en bestrijding van de iepenziekte.

In inoculation trials with hybrids the greatest number of non-susceptible progeny of good growth occurred in crosses with *Ulmus foliacea* No. 1 as ♂ parent and especially in the cross *U. foliacea* No. 28 × *U. foliacea* No. 1. *U. foliacea* No. 28 also gave many non-susceptible types of good growth after open pollination. Many resistant types occurred in hybrids having *U. pumila* or its varieties as one or other of the parents, but the habit of these was generally very similar to that of the *pumila* parent and few are being considered for further propagation. The very susceptible *glabra* types yielded very susceptible offspring. In 1943 the types listed for further use in hybridization were: *U. hollandica vegeta*, *U. foliacea* Nos. 1 and 28, *U. glabra* No. 49 and *U. wallichiana*.

A correlation of susceptibility with leaf shape and size is noted in the 1942 and confirmed in the 1943 report: the percentage of successful infections increases in the order—small-leaved *U. foliacea*, *U. foliacea*, large-leaved *U. foliacea*, *U. glabra*.

Up to the end of 1939 the average of successful infections of the 'Christine Buisman' Elm since 1932 had been 1·9 per cent. Figures for the succeeding years are: 1940 25 per cent., 1941 5·2 per cent., 1942 16·5 per cent., 1943 0·8 per cent. Infection of this Elm, however, was rarely followed by die-back. Spontaneous infection was reported in 4 cases for the 'Christine Buisman' Elm, for the first time, in 1943; of these, however, 3 cases showed no external symptoms at the end of October and were expected to recover. Attempts to secure rooting of cuttings of this Elm with the aid of heteroauxin and a proprietary growth substance ('Roche 202') have so far failed.

Of other types under trial, *U. foliacea* No. 63 has good growth and seldom showed symptoms of disease after inoculation; *U. pumila* hybrids Nos. 5, 6 and 7, though practically free from infection in earlier trials, developed disease in 1942; while *U. foliacea* No. 43 was given up on account of its yery high susceptibility to *Nectria*.

Inoculation of Elms with *Nectria cinnabarina* has shown that infection can be obtained the year round, but symptoms of die-back appeared only after inoculations during the growing season. Die-back from this cause was more frequent in the 'Christine Buisman' Elm than in *U. hollandica belgica*.

[2110]. 44.3 : 12.26–8 : 12.21 (492) : 12.11.3 : 05.3. HOLLAND. Comité ter Bestudeering en Bestrijding van Ziekten in Iepen en andere Boomsorten: Verslagen over 1944 en 1945. **[Committee for the Study and Control of Diseases of Elms and other Trees: reports for 1944 and 1945.]** H. Veenman and Zonen, Wageningen. 1946. pp. 31. [Du.du.] (*Mededeeling* No. 41).

The whole report is devoted to Dutch Elm disease and *Nectria cinnabarina* attack on Elms.

(i) *Reports of the 'W. C. Scholten' Phytopathological Laboratory*: 1944—*Ulmus hollandica vegeta* × *U. foliacea* No. 1 is a cross that given particularly good results. So far, progeny of *U. foliacea* '*Christine Buisman*' do not appear promising as regards disease resistance. Among grafts of selected numbers the following appear to remain entirely healthy: two numbers of *U. hollandica vegeta* × *U. foliacea* No. 1; one number each of *U. hollandica pitteursii* × *U. hollandica vegeta* and *U. hollandica vegeta* × *U. foliacea* No. 28; and open-pollinated *U. hollandica* Nos. 5 and 25. Of

U. foliacea No. 62, infections were secured on 10 out of 48 cases, but with one exception, all infected trees completely recovered during the course of the summer. The *Nectria* investigations were more or less in abeyance, as the strain used was found to have lost its virulence. Research on the influence of nutrition has shown that much K encourages infection. 1945—*Ulmus foliacea* No. 62 continues to show promise: in 6 years' inoculations 12·8 per cent. became diseased or slightly diseased, and though this percentage somewhat exceeds that in the 'Christine Buisman' Elm, attacks on No. 62 are usually very light and symptoms disappear during the course of the summer. Three apparently resistant numbers, which are to be tested further, are No. 132 *U. hollandica* No. 5, and Nos. 139 and 147 *U. hollandica vegeta* × *U. foliacea* No. 1. A review of inoculations on hybrids suggests that *U. hollandica*, *U. wallichiana* and *U. laciniata nikkoensis* give the best results as mother trees. Among 1945 seedlings inoculated for the first time, those of *U. hollandica belgica* were more susceptible than those of *U. foliacea* No. 28, and the latter in turn more so than those of *U. foliacea* No. 31. Inoculations of a large group of seedlings showed once more that the *Ceratostomella* strains can differ in pathogenicity. Renewed inoculations with a fresh strain of *Nectria cinnabarina* in early spring confirmed that the Christine Buisman Elm afterwards shows dieback, whereas in *U. hollandica belgica* no dieback occurred. The dormant season appears to give the greatest chance of infection.

(ii) Brief notes are also included on crosses made at the Genetics Laboratory, Wageningen, and on fellings for Dutch Elm disease control during 1944–45.

[2111]. 44.3 : 12.26–8 : 12.21 (71.4) : 13.2. McCallum, A. W. **The occurrence of Dutch Elm disease in Canada.** *For. Chron.* 22 (3), 1946 (203–9). Cf. *For. Abstr.* 7 (2042).

[2112]. 44.3 : 12.26–8 : 12.21 (71.4). Pomerleau, R. Rapport général des travaux effectués sur la maladie hollandaise de l'orme dans la Province de Québec en 1945. **[General report on measures taken against the Dutch Elm disease in the province of Quebec in 1945.]** Service forestier, Ministère des Terres et Forêts, Québec. [1946]. pp. 18 + 2. [F.]

[2113]. 44.3 : 12.26–8 : 12.21. Stoddard, E. M. **Soil applications of oxyquinolin benzoate for the control of foliage wilting in Elms caused by *Graphium ulmi*.** *Abstr.* in *Phytopathology* 36 (8), 1946 (682).

Elm trees, 1·5 in. d.b.h., were treated in lots of 10 trees each with an aqueous solution of oxyquinolin benzoate in concentrations of 0·1, 0·05, 0·025, and 0·0125 per cent. at the rate of 10 gallons per tree, applied to the soil. Each concentration was applied as a single application of 10 gallons and as 5 applications of 2 gallons each on alternate days for 10 days. Duplicate series of applications were made 10 days before and 10 days after inoculation of the trees with *Graphium ulmi*. A concentration of 0·1 per cent. reduced the trees that wilted to 27·5 per cent. as compared to 73·4 per cent. of the controls. Plots treated with this concentration uniformly had fewest trees wilting and the least wilting per tree, irrespective of manner or time of treatment. The plots treated with a single dose at all concentrations had more trees wilting and less wilting per tree than plots treated with multiple doses. There was no difference between plots treated before and after inoculation, either in number of trees wilting or the amount of wilting per tree. From the fact that *Graphium ulmi* was isolated from an approximately equal number of trees in all the treatments and the controls, it is suggested that the effect of the oxyquinolin benzoate was due to antidoting of the fungus toxin causing the wilting and was not due to fungicidal action.

45. DAMAGE BY ANIMALS

45.1. *Mammals*

[2114]. 45.12 : 12.25–8 : 13.2 (485). Göthner, E. Några synpunkter på älgens skadegörelse i mellansvenskt skogsbruk. **[Points of view on elk damage in central Swedish forestry.]** *Svenska SkogsvFören. Tidskr.* 44 (5), 1946 (413–29). [Sw.]

The author was unsuccessful in an attempt to establish a clear connexion between age-class distribution and the incidence of elk damage in certain areas in Östergötland, but is still persuaded that such a connexion exists. In view of the importance of the elk problem in central Swedish forestry, he urges the need for fuller investigation of the food, biology and habits of the elk, special research on the

incidence of elk damage on different land types and on the reduction in final timber value so caused. It is hoped that work in progress under Svenska Jägareförbundet may shed a good deal more light on the problem.

[2115]. 45.12 : 12.25. NYASALAND. **Annual report of the Forestry Department for the year ended 31st December, 1945.** Govt. Printer, Zomba. 1946. pp. 16.

An attack by field mice on young *Pinus caribaea* was successfully checked by a clean hoeing of the ground. Moles find the roots of *Pinus longifolia* very palatable and kill young trees (p. 3).

[2116]. 45.12 : 13.2 (78.3). HARMON, W. H. **Notes on mountain goats in the Black Hills.** *J. Mammal.* 25 (2), 1944 (149–51). [U.S. Forest Service, Denver, Colo.] B.A.P.

The food of the Rocky Mountain goat (*Oreamnos americanus* and subspecies) during the winter is moss and lichens (60 per cent.), *Arctostaphylos uva-ursi* (20 per cent.), twigs and needles of *Pinus ponderosa* (10 per cent.), and miscellaneous plants including species of *Ribes*, *Juniperus*, *Amelanchier*, *Rosa* and *Salix* (10 per cent.). Aspen (*Populus tremuloides*) appeared to be avoided in winter.

45.3. *Insects*

[2117]. 45.3 (410) : 44.3. GREAT BRITAIN. **Proprietary products for the control of plant pests and diseases.** Ministry of Agriculture and Fisheries and Department of Agriculture for Scotland. 3rd ed., 1946. pp. 6.

[2118]. 45.3 (492). ELTON, E. T. G. Overzicht der beschikbare gegevens over insectenplagen in onze bosschen en andere houtopstanden in het jaar 1945. [**Review of available data on insect pests in Dutch forests and other woody growth in 1945.**] *Nederl. Boschb.-Tijdschr.* 18 (9), 1946 (210–3). [Du.e.] [Biologisch Laboratorium 'Hoenderloo'.]

The data are summarized in two tables: I, a list of insect pests arranged by host species; II, degree of damage inflicted in the different provinces by each insect species.

[2119]. 45.3 (492) : 05.3. VOÛTE, A. D., and DISSEL, E. D. VAN. Verslagen van het Comité ter bestudeering en bestrijding van insectenplagen in bosschen over de jaren 1943, 1944 en 1945. [**Reports of the Committee for the Study and Control of Forest Insect Pests, for 1943–45.**] *Nederl. Boschb.-Tijdschr.* 18 (8), 1946 (180–3). [Du.]

Observations on larvae of *Cephaleia alpina* showed that their health is favourably affected by a severe winter: an abiotic factor connected with soil moisture is indicated as a reason why heavy attacks of this pest occur in pure plantations but not in mixtures. *Nematus erichsoni* severely damaged a Larch plantation in 1942, but in 1943 the attack was much reduced, a fact which is attributed primarily to the destruction of cocoons by wood mice.

Young Douglas Fir chermes (*Gillettea cooleyi*) can be carried from tree to tree by man, mammals and probably also birds.

Autumn is recommended as the time for control measures against *Diprion pini*, as it is the autumn generation that completely defoliates Pine stands; in an infestation in N. Brabant in 1944 young larvae of the spring generation were killed off by unfavourable weather. Some completely defoliated woods in the same province proved capable of recovery.

[2120]. 45.3 : 12.25–8 : 13.2 (469). BAETA NEVES, C. M., and REIS GOES, E. Nota sôbre algumas espécies de 'Ipidae' (Coleopt.) novas para a entomofauna florestal indígena. [**Note on some described species of Ipidae (Coleopt.) newly recorded in the indigenous forest insect fauna of Portugal.**] *Agros, Lisboa* 27 (3/6), 1944 (190–6). [Port.]

[2121]. 45.3 : 12.25 : 13.2 : 23.2. **Replanting of felled coniferous woodland in relation to insect pests.** *Leafl. For. Comm., Lond.* No. 25, 1945. pp. 7.

There seems to be no better way of protecting new coniferous plantations from the menace of *Hylobius* and *Hylastes* than by postponing replanting for 3 years after the end of the felling period. In localities where roots and small stumps dry out quickly the interval may be reduced to 2 years, but in northern exposed sites and at high elevations 4 years or even longer may be needed. In any case, stumps on the felling area must be sampled before the end of June to see if weevil breeding has ceased. Even when the stumps of felled or burnt trees on the planting area are found to be unfit for further breeding, it is necessary to maintain a marginal barrier of billet-and-spray

traps at one-chain intervals. Directions for making and operating these traps are given.

[2122]. 45.3 : 12.25 : 13.2. FRANZ, J. Lebensweise und forstliche Bedeutung des Tannentriebwicklers (*Cacoecia murinana* Hb.) **[The life history and importance in forestry of the Silver Fir shoot tortricid (*Cacoecia murinana*).]** *Forstwiss. Cbl.* 62 (7), 1940 (143–54). [G.] Cf. *For. Abstr.* 4 (130).

[2123]. 45.3 : 12.25 : 13.2 (71). MORRIS, R. F. **Green River project.** *Bi-m. Prog. Rep. For. Insect Invest. Dep. Agric. Canada* 2 (3), 1946 (2).

The analysis of the growth pattern on several hundred stumps in various cut-over stands has provided further data on the relation of Spruce budworm damage to stand factors during the last outbreak, which lasted from 1913 to 1918. As a result of this outbreak, some stands suffered heavy mortality, while in other stands mortality was negligible. There was no significant difference in species composition or diameter of the two types of stand, but there was a significant difference in age. Those which survived had an average age of 45 years at the time of attack and were initially released in 1870–80, while those which suffered heavy mortality had an average age of about 75 years and were initially released in 1850. This substantiates the work of earlier investigators and indicates that, in softwood stands of high Balsam Fir content, age, or some factor closely associated with age, plays a major rôle in determining the vulnerability of the stand to budworm damage. The initial attack, however, occurred in the same year in both old and young stands, there being no evidence that the population was first built up on the older trees. The stands which survived the last attack occupy the greater part of the Green River region and have now reached the vulnerable age of 75.

Radial growth was measured for the 5-year periods before and after attack respectively, and the results indicated that slow-growing trees suffer a proportionally greater reduction in growth due to budworm feeding than do faster-growing trees.

[2124]. 45.3 : 12.25 : 13.2 (71). BALCH, R. E. **Summary account of Green River project, May, 1946.** *Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 857 (F–3), 1946. pp. 6.

A summary of the investigations so far carried out on this project on Spruce budworm ecology and control and an outline of the programme of future research. [Cf. previous abstract.]

[2125]. 45.3 : 12.25 : 13.2. STOFFEL, B. Lariks en lariksmot. **[Larch and Larch moth.]** *Ned. Boschb.-Tijdschr.* 13 (7), 1940 (352). [Du.]

An admixture of deciduous shrubs is recommended for plantings of Japanese Larch on sandy heathland, both to keep down heather and other vegetation and to reduce attacks by the 'Larch moth' [? *Coleophora laricella*].

[2126]. 45.3 : 12.25 : 13.2 (51). LI, Y. K., and MIAO, C. P. **Study of the Pine Moth (*Dendrolimus punctata* Walker) of Nanking and its vicinity.** *J. For. Ass. China* No. 10, 1943 (31–48). [Chin.e.]

The food-plants in Nanking are *Pinus massoniana* and *P. thunbergii*. There are 3 generations a year with hibernation in the 2nd or 3rd larval instar.

[2127]. 45.3 : 12.25 : 13.2 (492). VOÛTE, A. D. *Pissodes piniphilus* Hbst. in het Nationale Park 'De Hoge Veluwe'. **[*Pissodes piniphilus* in the 'De Hoge Veluwe' National Park.]** *Ned. Boschb.-Tijdschr.* 13 (8), 1940 (362–9). [Du.g.e.]

In 1939–40, *P. piniphilus*, formerly almost unknown as a pest in Holland, killed a large number of older Scots Pines in this park. The larvae over-wintered, after completing their 'cocoons', in their pupal chambers, pupated in May–June and emerged in June–July. The adults preferred certain individual trees for oviposition. Such trees were not diseased or weakened by other insects, and no reason could be found for this preference. The weevil cannot, therefore, be regarded as a secondary pest. More than 90 per cent. of the larvae and pupae were eaten by woodpeckers: parasites were of no importance. From *author's summaries.*

[2128]. 45.3 : 12.25 : 13.2 (492). VOÛTE, A. D. *Pissodes pini* L. in het Nationale Park 'De Hoge Veluwe'. **[*Pissodes pini* in the 'De Hoge Veluwe' National Park.]** *Ned. Boschb.-Tijdschr.* 13 (10), 1940 (443–5). [Du.]

Brief notes from literature and from observations in 1939–40 on the life history of *P. pini*, which, unlike *P. piniphilus* [cf. preceding

abstract] appears to be merely a secondary pest of Scots Pine in this locality, as in no instance was a sound tree attacked.

In the winter 1939–40 the full-grown larvae overwintered like those of *P. piniphilus*, pupated as early as April, but did not emerge before June. The rough lower bark seemed to be preferred for oviposition: in trees attacked by both species of weevil *P. pini* was always found lower in the stem than *P. piniphilus*, which attacked in the region of thinner scaly bark. Examination of 716 larval galleries showed that woodpeckers had taken about 50 per cent. of the larvae. Parasites were seldom found.

In properly thinned woods *P. pini* would probably never become a pest, as attacked trees would be removed in thinnings.

[2129]. 45.3 : 12.25 : 13.2 (492). VOÛTE, A. D., and WALENKAMP, J. F. G. M. De oorzaak van het optreden van gradaties van de dennenlotrups (*Evetria buoliana* Schff.) en de mogelijkheid deze te voorkommen. [**The cause of the occurrence of outbreaks of *E. buoliana* and the possibility of control.**] *Nederl. Boschb.-Tijdschr.* 18 (4–6), 1946 (84–8; 104–11; 128–35). [Du.e.] [Biologisch Laboratorium 'Hoenderloo'.]

The life history of *E. buoliana* in Holland is as described in accounts from other countries. Climatic factors normally have no effect on oviposition. Outbreaks of *Brachyderes incanus* are almost always followed by outbreaks of *E. buoliana*. General outbreaks of the latter were found to be closely correlated with July drought, but the climatic effect is an indirect one in that observations show the limiting factor to be moisture of the tree: the drier the tree the greater the chance that the larvae, newly hatched in July, will be able to effect entrance. Local outbreaks may occur in both dry and wet Julys, but are probably rendered possible by circumstances, e.g. *Brachyderes* attack, contributing to moisture deficit in the tree in July. Particular liability to *E. buoliana* attack was found (*a*) in poor stands on dry ground; (*b*) where the ground had been deeply dug; (*c*) on ground with too high a water table; (*d*) where large ball plants had been used; (*e*) where canopy had not yet closed; (*f*) in crowns projecting above the general level and other exposed trees. Parasites appear incapable of preventing outbreaks.

Suggested counter measures are: (i) maintenance of high moisture in the trees, e.g. by avoidance of deep digging when replanting, provision of soil cover and promotion of early canopy closure (the two latter are also effective in controlling *Brachyderes*); (ii) removal of trees with crowns exposed above the general crown level, as these are liable to infestation in normal years and thus tend to maintain a population level high enough for the start of an outbreak when other factors become favourable.

[2130]. 45.3 : 12.26–8 : 13.2. NEU, W. Die Bekämpfung von Maikäferengerlingen mit Kalidüngemitteln. [**Control of cockchafer larvae with potassium fertilizers.**] *Ans. Schädlingsk.* 16 (7), 1940 (73–5). [G.] [Institut für Pflanzenkrankheiten der Universität Bonn.]

[2131]. 45.3 : 12.26–8 : 13.2. KHAN, A. H., and BHATIA, B. M. ***Aphrodisium hardwickianum* White (a borer of *Quercus incana*) and its control.** *Indian For.* 72 (6), 1946 (271–2 + plate). [Forest Entomology Branch, Forest Research Institute, Dehra Dun.]

The most serious borer of *Quercus incana* in Kangra Forest Division, Punjab, is *Aphrodisium hardwickianum*. Although its annual incidence is relatively low, the accumulation of damage over several years renders attacked trees useless for any purpose except fuel. The habits are described. Complete control was achieved cheaply (1) by plugging the crescent-shaped exit-holes with a rag soaked in coal tar, and (2) by tightly hammering stones into the holes to prevent the exit of the beetles. The first treatment is preferable owing to potential damage by the stones to saws and axes. Only one operation per year is necessary; the holes to be treated are not numerous and are generally accessible (within 6 ft. of ground level).

[2132]. 45.3 : 12.26–8 : 13.2 (469). Campanha contra a *Lymantria*. [**Campaign against *Lymantria*.**] *Bol. Junta nac. Cortiça, Lisboa* No. 88, 1946 (147–8, 152, xxvii). [Port.e.]

A Commission composed of members of the Direcção Geral dos Serviços Florestais, the Junta Nacional da Cortiça, and the Associação Central de Agricultura Portuguesa has been appointed to organize a 3-years campaign against *Lymantria dispar* on Cork Oak and to report on the results of spraying.

[2133]. 45.3 : 12.26–8 : 13.2. MOUTIA, L. A., and VINSON, J. Le charançon de

l'eucalyptus, *Gonipterus scutellatus* Gyll. **[The Eucalyptus weevil, *Gonipterus scutellatus* Gyll.]** *Rev. agric. Ile Maurice* 24 (1), 1945 (25–30). [F.] L.S.

Description, biology, geographical distribution, host plants, economic importance, natural enemies, and methods of control.

[2134]. 45.3 : 12.26–8 : 13.2. KEVAN, D. K. McE. **The Eucalyptus weevil in East Africa.** *E. Afr. agric. J.* 12 (1), 1946 (40–4). [Department of Agriculture, Kenya.]

The Eucalyptus weevil (*Gonipterus scutellatus*) was first noticed in East Africa in November, 1944, and by March 1945, the mymarid parasite *Anaphoidea nitens* had been introduced from South Africa. A description is given of the weevil, its life history, and the damage caused by it, and its present distribution in West Africa is noted. The life history of the parasite is briefly described, and the method of determining its presence in the field is given. The parasite had already become well established by October, 1945, as in some areas a very high degree of parasitism had been reached. Some improvement seems already to have taken place in some plantations and the prospects for the future seem good. *From author's summary.*

[2135]. 45.3 : 12.26–8 : 13.2. BOSQ, J. M. El 'escarabajo negro del trigo' puede ser dañino a la silvicultura. **[The 'black wheat beetle' (*Dyscinetus gagates*, Burm.) can be a danger to silviculture.]** *Alm. Minist. Agric. Argent.* 20, 1945 (65–7). [Span.] I.I.E.

A record of severe damage by *Dyscinetus gagates* Burm. to the roots of 1-year-old *Eucalyptus* plants grown in soil previously used for agricultural purposes.

[2136]. 45.3 : 12.26–8 : 13.2. USINGER, R. L. **Biology and control of the Ash lace bug, *Leptoypha minor*.** *J. econ. Ent.* 39 (3), 1946 (286–9). [Univ. of California, Davis.]

The Ash lace bug after hibernation as an adult has a series of monthly generations from April until October, and is most injurious in late summer. The nymphs live in colonies on the undersides of the leaves, causing whitening with black spotting of the under surfaces due to fecal deposits. Both nymphs and adults were completely controlled with a rotenone-oil mixture at 1 to 800. From 12 to 20 gallons of spray should be used depending upon the size of the tree.

[2137]. 45.3 : 12.26–8 : 13.2. DEAN, G. A. **The Elm calligrapha.** *Circ. Kans. agric. Exp. Sta.* No. 234, 1946. pp. 7.

Life history and habits of *Calligrapha scalaris*, together with natural control, preventive and remedial measures.

[2138]. 45.3 : 13.2. Werden die stark behaarten Raupen von den Vögeln gefressen? **[Are very hairy caterpillars eaten by birds?]** *Anz. Schädlingsk.* 16 (12), 1940 (143–4).

Resumé of an article by H. Weidner in *Dtsch. Vogelwelt* 65 (2 and 3), 1940 (47–50, 75–8) discussing the common view that only the cuckoo eats very hairy caterpillars. Records are given of other birds reported to destroy hairy caterpillars of various species.

[2139]. 45.3 : 13.2 (410). DUFFY, E. A. J. **Records of coleopterous larvae from Surrey, with a note on host-plants.** *Ent. mon. Mag.* 82 (90), 1946 (270–3).

[2140]. 45.3 : 13.2 (95). FRENCH, C. **Records of native insects attacking introduced plants.** *Vict. Nat.* 61 (3), 1945 (58–60). O.R.S.

Many native insects of Victoria are changing over from their natural food to that offered by cultivated alien plants. For example, the Emperor Gum Moth (*Antherea eucalypti*), whose natural diet is Eucalypt foliage, turned first to the Peruvian Pepper tree (*Schinus molle*) with a very different sap; it has since gone on to Roses, Apple, Plum, Apricot, and many kinds of street tree. A list is given of records of such changes observed in Victoria.

[2141]. 45.3 : 33.36.1 : 07.7. **Report on the use of DDT in the control of forest insects.** *Bi-m. Prog. Rep. For. Insect Invest. Dep. Agric. Canada* 2 (1), 1946 (1–8).

There are here brought together a number of reports on experimental work with DDT in the control of forest insects during the year 1945. The operations reported include the aerial spraying of 100 sq. miles of budworm-infested forest in the Lake Nipigon region of Ontario and of 1,000 acres of budworm-infested forest in the Kabonga Lake region of Quebec [cf. *For. Abstr.* 7 (2078)]. One clear deduction from the season's work is the need of further research in order to obtain better spray deposit control. Experiments at the Fredericton Laboratory, on the protection of unpeeled logs

from injury by borers, indicate that thorough spraying at the proper time with an oil solution containing 2½–5 per cent. DDT may give excellent protection; further tests are in progress. Experiments carried out at Fredericton have shown that a thorough spraying of the foliage of shade trees with DDT in a water suspension (AK20), at concentrations as low as ¼ lb. of DDT to 100 imperial gallons, will give practically complete control of fall cankerworm [*Alsophila pometaria*] in the larval stages. Indications are that, under average weather conditions, spraying the basal 8 ft. of the trunk with a 5-per-cent. oil emulsion will give good control, possibly comparable with the much more expensive and troublesome spraying of foliage, provided it is done shortly before the commencement of emergence of the wingless females. Notes are given on two blower-atomizing units and various types of atomizing nozzles and assemblies developed by the U.S. Bureau of Entomology and Plant Quarantine for applying finely atomized, highly concentrated sprays at low gallonages per acre.

5. MENSURATION. INCREMENT. YIELD

52. MEASUREMENT OF TREES AND TIMBER

52.4. *Measurement of Volume*

[2142]. 52.43 (73). ZILLGITT, W. M. **A quick method of estimating cull in Northern hardwood stands.** *Tech. Note Lake States For. Exp. Sta* No. 255, 1946. pp. [1].

[2143]. 52.43.2. CAPO, E. Normas para la medición de maderas. **[Standards for the measurement of timber.]** *Maderil* 18 (7), 1946 (9–11, 13, 15–6). [Span.]

Examples are given of standard methods of measurement of wood in the rough, logs, and saw timber, with allowances to be made for defects.

[2144]. 52.43.2. MUNGER, T. T. **Sample scaling by trees.** *For. Res. Note Pacif. Nthwest For. Exp. Sta.* No. 33, 1945 (12–3).

An earlier study [see *For. Abstr.* 6 (119)] by Briegleb having indicated the possibility of sample scaling for West Coast logs, a further test was made of a set of scale books involving 103,208 logs from central Oregon. The results indicated that, to be within a 2-per-cent. limit of error, 33 per cent. of the logs must be scaled in a 10,000-log transaction, 20 per cent. in a 20,000-log transaction, and only 5 per cent. in a 100,000-log transaction. A further test was made to determine whether time could be saved by sampling by trees instead of logs. A statistical analysis of the volumes of 28,518 trees indicated that the coefficient of variation of the volumes of these trees was 77·57, which is rather larger than the variation in the logs, so that a larger proportion of trees than of logs would have to be scaled in order to attain the same degree of reliability. A table is given, from which it is possible to read off the size of sample required for trees that vary in about the same degree as the batch studied.

[2145]. 52.43.2 (485) : 92. PALMQUIST, P. O. Förslag till ny lag om virkesmätning. **[Proposals for a new law on timber scaling.]** *Svenska SkogsvFören. Tidskr.* 44 (5), 1946 (430–40). [Sw.]

[2146]. 52.43.2 : 07.7. : 33.17. JOHNSON, R. C. **The sawmill scale (index) board.** *Quart. Bull. Mich. agric. Exp. Sta.* 28 (3), 1946 (181–8).

A research project for the improvement of small sawmills was recently initiated at Michigan State College and this article is the first progress report on it. It consists mainly of instructions for the construction of an indicator to guide the sawyer in setting the log to produce lumber of desired width and thickness without waste.

[2147]. 52.43.2 : 31.23. SCHUMACHER, F.X. **Volume-weight ratios of Pine logs in the Virginia-North Carolina coastal plain.** *J. For.* 44 (8), 1946 (583–6). [School of Forestry, Duke Univ., Durham, N.C.]

The writer discusses certain advantages of the weight scale for pulpwood logs over corresponding volume scales. The ratios of volume to the green weight of Pine pulpwood logs and sawlogs are given for peeled volume, stacked volume, and bd. ft. log scale.

[2148]. 52.43.2 : 53. BICKERSTAFF, A. **Scaling 16-foot pulpwood by stacked measure.** *Silvic. Leafl. Dom. For. Serv.* No. 24, 1946. pp. 2.

In order to determine how measurement of pulpwood by the stacked cord compares with more usual methods of scaling, a check was made of about 60 cords of Spruce and Balsam contained in about 1,000 logs averaging 7·6 in. in diameter, which had been stacked in four approximately equal stacks. From this preliminary check it appears that the stacked cord is a satisfactory unit of measurement for 16-ft. pulpwood, but requires reasonably careful piling of the stacks.

[2149]. 52.43.3 : 07.7. FERREE, M. J. **The pole caliper.** *J. For.* 44 (8), 1946 (594–5).

Description of an implement evolved at the Northeastern Forest Experiment Station for measuring tree diameters at the top of the first 16-ft. log to obtain the Girard Form Class. It consists of an ordinary 24-in. tree caliper mounted on a 12-ft. pole, and is operated by means of strings which open and close the jaws.

[2150]. 52.43.4 : 74.2 : 01.7. NYLINDER, P. Om antalet provträd vid värdering av stämplingsposter. [**On the number of sample trees in the valuation of lots marked for felling.**] *Svenska SkogsvFören. Tidskr.* 44 (5), 1946 (389–95). [Sw.]

An example is given to illustrate the calculation of the number of sample trees required for assessing stumpage value with a given percentage error, with emphasis on method and not, in view of the smallness of the populations analysed, on the actual figures obtained.

52.46. Strip Surveys. Enumerations. Timber Cruising

[2151]. 52.46 : 01.7 : 12.25 : 12.26–8. GRIFFITH, A. L. **The efficiency of enumerations. XII. One species in a mixed forest (Teak in a Madras moist mixed deciduous forest). XIII. Confirmation of the Chir (*Pinus longifolia*) and Sal (*Shorea robusta*) data. XIV. Summary of indications.** *Indian For. Leafl.* (*Silviculture*) No. 93, 1946. pp. 14.

An earlier leaflet [cf. *For. Abstr.* 7 (No. 1432)] dealt with enumerations of all commercial timber in Madras moist mixed deciduous forest; Sect. XII of the present leaflet re-examines the data from the point of view of the most important species (Teak) only and the separate size classes of this one species, which forms only one-third to one-quarter of the crop. The results indicate that in such a forest, even when dealing with only one species, a 5-per-cent. or 10-per-cent. enumeration is sufficient for all practical purposes, provided that the probable fertility gradients of the forest are taken into account. Sect. XIII gives confirmation of the indications given in leaflets 88 and 90 that partial sampling in Chir and Sal gives results accurate enough for working plans [cf. *For. Abstr.* 7 (Nos. 2091–2)]. Sect. XIV summarizes the indications that have arisen from this work so far. *From author's summary.*

[2152]. 52.46 : 61.32. LOOMIS, R. D. **Accuracy in timber estimating.** *For. Chron.* 22 (3), 1946 (201–2). [Brompton Pulp and Paper Co. Ltd., Nipigon, Ontario.]

A tract of 2,700 acres in the Shadow Creek Watershed, Ontario, was estimated twice in order to compare the accuracy and cost of two methods of cruising. In each case a forest type map was compiled from aerial photographs before commencing the field work. The first estimate was made from a 5-per-cent. cruise run in the usual way—base lines two miles apart, and ½-chain strip lines from one base line to the other at 10-chain intervals. The second estimate was compiled from the information on the air photographs, supplemented by a not more than 1-per-cent. field check and the forest type map. The field check consisted in tallying on the ground one-quarter-acre plots selected from a careful examination of the photographs, so as to obtain an average volume per acre of the whole stand contained within the boundaries of any particular type. The spots selected for plots were marked on the photographs and map and were easily located on the ground. The latter method of field checking allows greater scope for examining logging possibilities and quality of timber in each type and also costs much less—in this instance, 34 man days of field work as against 60 days by the ordinary base-line method of cruising. Later an area of 18·4 acres was cut and scaled, producing 513·74 net cords compared with estimates of 583·8 cords by the base-line method and 507·8 cords by the selected plot method. With results such as this on a small area and with a comparatively small percentage of field checking, it may be safely assumed that on the large tract the accuracy will be well within an allowable error of ± 10 per cent. even if this particular check happens to be unusual.

53. SOLID CONTENTS OF STACKED MATERIALS

[2153]. 53 : 33.32. SCHUMACHER, F. X. **Stacked and solid volume of southeastern pulpwood.** *J. For.* 44 (8), 1946 (579–82). [School of Forestry, Duke Univ., Durham, N.C.]

Five groups of data, representing 118 stacks of pulpwood bolts, gave the solid volume, stacked volume, and number of bolts in each stack, as obtained from different places in Virginia, North Carolina, South Carolina, and Georgia. Although the groups were characterized by variation in species mixture, a single expression of stacked volume U in standard cords, in terms of number of bolts, N, and of solid volume V in cubic feet, in which

$$U = 0{\cdot}00195N + 0{\cdot}00932V$$

was found to fit the data of each group adequately. Freedom from systematic variation in the actual stacked volumes is ascribed to the fact that all the sample stacks had one property in common: all had been stacked by experienced pulpwood workers. Several useful expressions involving the relationship between stacked and solid volume are derived. A table gives proportion of the 128-ft. cord, and number of 5½-ft. bolts to the cord according to average bolt diameter. Another useful transposition supplies the ratio of solid to stacked volume in terms of average number of bolts N^1 to the sq. ft. of stack face.

56. INCREMENT

[2154]. 56 : 12.25 (492) : 57 : 21.0. TUTEIN NOLTHENIUS, P. M. **Een en ander betreffende den groei van jonge lariks opstanden (Jap. lariks) in de houtvesterij 'Breda'.** [**Notes on the growth of young stands of Japanese Larch in the Breda Forest District.**] *Nederl. Boschb.-Tijdschr.* 18 (4), 1946 (76–83). [Du.]

A discussion of sample-plot data (tabulated) from eight plots (five 16 years old, the rest younger), including stem analyses (diagrams) of the four trees on each plot most closely representing the mean tree. Averages for four of the 16-year-old plots in one subdistrict were: stem volume per ha. 115 cu.m., increment per cent. (Pressler) between 14 and 16 years of age 7·64, height 10·50 m., stem form factor 0·51, bark per cent. 14·21. Corresponding values for the fifth 16-year-old plot, in another district, were 138, 7·29, 11·50, 0·53, 11·57. The results are regarded as very satisfactory, particularly in comparison with Scots Pine of comparable age.

[2155]. 56 : 12.25 : 22.14 : 31.2. PEARSON, G. A. **Age-and-vigour classes in relation to timber-marking.** *J. For.* 44 (9), 1946 (652–9). [U.S. Forest Service, Tucson, Ariz.]

Studies of growth by 'age-and-vigour' classes, and their application in management commonly make several fundamental errors. (1) On cutover lands, a classification made now is assumed to apply at the time of cutting, perhaps 30 years ago; actually, many trees advance or decline one or more grades in 'vigour' or crown size during such a period. (2) Growth within each class is averaged for the whole period, regardless of changes during the period, and disregarding wide variations between individual trees, due to factors other than age or crown size. (3) Trees whose crown has declined as a result of disease or injury are put in class C or D, and their slow growth is used in pulling down the average of these classes. (4) The fact that a class A tree usually occupies many times as much space as a class C tree is ignored, as is also the fact that the C tree is potentially of much higher quality. (5) The possibility of improving growth and quality by cutting is overlooked. A second cutting at Fort Valley has demonstrated that well released class C trees can be made to grow as fast as those of class A or B; clean-boled C trees which grew 1 in. or less in diameter during 10 years before cutting have grown as much or more during 5 years after release by cutting. *Author's summary.*

[2156]. 56 : 21.6 : 57 : 12.11.1 : 12.26–8. MØLLER, C. M. Grundfladetilvækstens Forløb, negative Grene m.m. [**The course of basal-area increment, negative branches, etc.**] *Dansk Skovforen. Tidsskr.* 31 (8), 1946 (353–71). [Dan.] LADEFOGED, K. Hvorledes egaliserer Skoven sig? [**How does equalization [of growth] take place in the forest?**] *Dansk Skovforen. Tidsskr.* 31 (8), 1946 (372–85). [Dan.]

Bavngaard's recent paper invoking 'negative' branches as the explanation of certain growth phenomena [see *For. Abstr.* 8 (No. 1481)] is severely criticized by both Møller and Ladefoged.

Møller first takes the occasion to refute criticism in Bavngaard's paper of his own conclusion that basal-area increment of Beech is practically uniform regardless of site quality, at least in older stands [see *For. Abstr.* 7 (No. 2096)].

As regards 'negative' branches Møller's chief points are: (i) If suppressed branches live on assimilation products of the rest of the crown, why do they eventually die? Advance growth of comparable size and leaf area will survive, though with a minimum of growth, under the same conditions of light as a dying 'negative' branch. (ii) The furrow in the stem under a supposedly 'negative' branch can be found under branches in the upper crown of trees in lightly thinned woods. The argument that heavy thinning encourages 'negative' branches and thus detracts from increment is scarcely valid, as under light thinning a larger volume will be lost in suppressed branches than under heavy thinning. (iv) Literature on the removal of living branches is reviewed. The more comprehensive experiments have admittedly shown that the productive capacity of the lower branches approaches zero, but there is no evidence of 'negative' production. Experiments on individual trees (such as Bavngaard's) have shown great variation, largely unexplained and certainly inadmissible in evidence.

Bavngaard's 'equalization' is in Møller's opinion largely a result of the decline of height increment with age. When, in an uneven-aged stand, the younger trees catch up in height with the older ones whose height increment is approaching a minimum, the lower parts of the broad older crowns will become suppressed. When all trees finally converge towards the same height, the younger will have roughly the same length of crown as the older, but owing to their former dominant position, the older will have a more unfavourable ratio between live crown and stem volume and their competitive ability will be further restricted by relatively greater respiration losses. Similar conditions can hold good, though to a more limited degree, in even-aged stands.

The stem furrows under suppressed branches can be explained by the interruption by such branches of the downward flow of assimilation products from the crown, combined with their failure to provide an equivalent supply of products of their own making.

Ladefoged also dismisses as very improbable the idea that suppressed branches may obtain organic nutrients from the rest of the tree except during foliation. The furrows associated with such branches are best explained by the essentially similar reasons put forward by Münch and Møller. If water and mineral nutrients are available in plenty, a suppressed branch should still make a very modest contribution to increment. Nevertheless the possibility must be allowed that where minerals and water are in short supply suppressed branches may consume supplies of these substances that would be more economically used in 'working' branches.

As regards 'equalization', Ladefoged suggests that one of the chief factors may be sought in growth-regulating substances and particularly in variations in the mutual inhibition between leaders and upper lateral shoots in response to varying access to light. Thus in more or less free crowns the laterals would tend to develop strongly and to inhibit leader growth, whereas in a closed stand the leaders of trees below the general height would receive most of the available light and would develop more rapidly than and exert inhibitory effects on the laterals.

[2157]. 56.01 : 12.26–8 (82) : 56.02. JOZAMI, J. M. Observaciones sobre el creimciento [crecimiento] de Salicáceas en el vivero experimental del Delta Entrerriano. [**Observations on the growth of Salicaceae in the experimental nursery of the Delta Entrerriano.**] *Maderil* 19 (9), 1946 (21–2). [Span.]

Data on the height and diameter growth of 1– to 2-year-old *Populus* and *Salix* spp.

[2158]. 56.02 : 12.25 : 11.32. DAUBENMIRE, R. F. **Radial growth of trees at different altitudes.** *Bot. Gaz.* 107 (4), 1946 (462–7). [Univ. of Idaho.] O.B.D.

Radial changes were followed in 32 trees growing on Thatuna Ridge in northern Idaho. Four trees of each species (*Abies grandis*, *Larix occidentalis*, *Pinus ponderosa*, and *Thuja plicata*) were located at relatively low altitude, and the other four at relatively high altitude. The period of observation extended from April 19 or May 15 until October 17, 1942.

In spring the most apparent effect of the vertically stratified climates on tree growth consisted of a well marked retardation of cambial activity at high altitudes, which was probably due to the temperature gradient. In summer and early autumn the water-balance

gradient exerted the most evident influences as shown by differences in the amount of shrinkage. At low altitudes the [illegible]ks invariably shrank in late summer. At high altitudes shrinkage was either less pronounced or not evident.

The higher the altitude, the later the trees attained their maximal growth rates, and the later the effects of dry summer weather became evident. The time when radial enlargement is completed varies widely among the four species and is strongly affected by altitude. *From author's summary.*

[2159]. 56.02 : 56.1. BICKERSTAFF, A. **Assessing the growth of individual trees by radial increment.** *Silvic. Leafl. Dom. For. Serv.* No. 23, 1946. pp. 2.

A method is described for determining whether a given tree is growing in basal area or volume as fast as, or faster or slower than, it has been growing on an average in the past. A table is constructed showing mean annual increment in basal area expressed as radial growth in inches for the last ten-year period. The actual radial growth in inches for the past 10 years is obtained from an increment boring or stump measurement and is compared with the appropriate stump value which represents the amount of radial growth required for the same period to maintain a basal-area growth equal to the past average. The table is given with an explanation of its construction.

[2160]. 56.03 : 12.26–8 : 64. HENRIKSEN, H. A., and JØRGENSEN, E. Grundfladetilvækst i Bøgeskov. **[Basal-area increment in Beech forest.]** *Dansk Skovforen. Tidsskr.* 31 (10), 1946 (475–86). [Dan.]

An examination of some of the chief figures from the older Beech sample plots of the Danish Forest Research Organization confirms C. M. Møller's conclusion that basal-area increment in this species is uncorrelated with site-quality class [cf. *For. Abst.* 7 (No. 2096); 8 (No. 2156)], and suggests that variation in basal-area increment in different stands of the same age group is due largely to characteristics of the stands themselves and only to a small extent to factors such as errors in measurement and climatic fluctuations.

[2161]. 56.04 : 65 : 66. NAGEL, J.-L. Calculs d'accroissement par classe de grosseur et essence. **[Calculation of increment by diameter class and species.]** *Schweiz. Z. Forstw.* 97 (10), 1946 (431–42). [F.g.]

Nagel notes an evident decline of increment on trees over 60 cm. d.b.h. in the forests of Boveresse, and discusses the question how far the retention of old trees can be justified in view of decreasing increment and increase in defects. He stresses the need for subdivision of the high diameter class (*gros bois*), by diameter and species, in order to improve increment calculations. Establishment of a class for very high diameters (*très gros bois*) would enable more accurate determination of decreases in increment, and also possibly a rough determination of physiological and financial maturity to be made from diameter.

57. DEVELOPMENT AND STRUCTURE OF STANDS. YIELD

[2162]. 57 : 12.25 : 22.89 : 76 (492). KUHN, A. F. Over de rentabiliteit van den groenen douglas. **[On the financial returns of 'Green' Douglas Fir.]** *Nederl. Boschb.-Tijdschr.* 13 (12), 1940 (501–7). [Du.du.]

The data available for 'Green' Douglas in Holland are too limited to serve as anything but rough indications that (*a*) despite higher plantation costs than for Scots Pine, Green Douglas appears to give a better chance of good financial returns; (*b*) even if yields in practice should prove 20 per cent. below those of yield tables, the planting of Green Douglas on forest land would still appear to show a profit.

[2163]. 57 : 33.7 (68.9). NYASALAND. **Annual report of the Forestry Department for the year ended 31st December, 1945.** Govt. Printer, Zomba. 1946. pp. 16.

Records over many years indicate that the yield of firewood from *Uapaca/Brachystegia* woodland is about 81 cu. ft. per acre per annum and from *Copaifera mopane* forest about 36 cu. ft. *Acacia campylacantha* thickets, if grown on a rotation of 8–10 years, are likely to show an increment about 3 times as large as that of *Uapaca/Brachystegia*. *Eucalyptus* of the best class will give about 1,080 cu. ft. of firewood per acre per annum, but plantations on poorer sites or badly managed give a mere fraction of this yield (p. 5).

[2164]. 57.9 : 12.25 (410). **Forestry Commission yield tables for Scots Pine and other conifers.** H.M. Stationery Office, London. 1946. pp. 24.

These tables are reproduced for field use from Forestry Commission Bulletin No. 10, 'Growth and Yield of Conifers in Great Britain', which is temporarily out of print.

[2165]. 57.9 : 12.25 : 33.32 (46). ECHEVERRÍA, I., and PEDRO, S. DE. *Pinus insignis* D.: Crecimiento y producción en el Norte de España y aplicación a la elaboración de pastas de celulosa. [***Pinus radiata*: Growth and production in the north of Spain and use in the manufacture of paper pulp.**] [*Publ.*] *Inst. for. Invest. Exp., Madrid* 15 (31), 1944. pp. 54. [Span.]

Revised edition of a booklet first published in 1931. Yield tables are given for *Pinus radiata* in five quality classes. The physical and chemical properties of the wood are discussed with special reference to its use for paper pulp, and to the effect of silvicultural practices on tree growth and quality.

6. MANAGEMENT. WORKING PLANS. SURVEYS

60. GENERAL LAND MANAGEMENT

60.1. *Management of Non-forest Land*

[2166]. 60.1 (76.4) : 34.21. CAIRD, R. W., and MCCORKLE, J. S. **Contour-furrow studies near Amarillo, Texas.** *J. For.* 44 (8), 1946 (587–92). [Soil Conservation Service, Amarillo, Texas.]

Report on studies made during the period 1937–43, on (*a*) the effects of contour-furrowing on the amount, density, and composition of vegetation, (*b*) the rate of recovery of the areas disturbed by furrowing, (*c*) the most effective size and spacing of furrows under various slope conditions. Erosion by wind and water were not measured, nor was any effort made to compare the effect on erosion of the same sort of contour-furrow treatment on different slopes.

60.3. *Management of Different Classes of Forest*

[2167]. 60.31.2 (73) : 2 : 4. **Timber growing technique.** *W. Cst. Lumberm.* 73 (8), 1946 (56–7, 100–1).

A report on the replies received to a questionnaire addressed to a large number of 'tree farmers' and foresters in the United States on the measures they considered necessary in order to speed up tree growing. The ten suggestions made in the returns were, in order of frequency: fire protection; adequate seed resource; intermediate thinning of second-growth forests; planting of areas not adequately reseeding; avoidance of broadcast slash burning; permanent road and transport systems; application of silvicultural measures to increase growth and value; selective cutting; consultation with qualified foresters; maximum utilization of forest products. Two replies are given in detail and others will be printed in later issues.

[2168]. 60.31.2 (73) : 2 : 4. **Timber growing technique.** *W. Cst. Lumberm.* 73 (9), 1946 (82, 84, 86).

A selection of replies to a questionnaire, which have already been summarized in a previous issue [cf. previous abstract].

[2169]. 60.31.2 (79). BARR, P. M. **Management of western forest lands as a permanent business.** *Timberman* 47 (11), 1946 (38–9, 65–6, 68, 70). [School of Forestry, Univ. of California.]

Advice to forest owners in the north-west Pacific area on how to manage their land remuneratively for sustained yield. The writer stresses the need for enough good land to ensure a predetermined annual net income and the impossibility of proper management on a property which has an undue burden of debt or over-investment.

[2170]. 60.31.2 : 94.3 (76). CHAMBERLIN, H. H., SAMPLE, L. A., and HAYES, R. W. **Private forest land ownership and management in the Loblolly-Shortleaf type in Southern Arkansas, Northern Louisiana and Central Mississippi.** *Bull. La. agric. Exp. Sta.* No. 393, 1945. pp. 46.

The purpose of this investigation was to determine, on limited areas, the effect, if any, of different types and sizes of forest land ownership on cutting practice and management policies. The industrial owners in this area represent less than 1 per cent. of the total

number of owners, but control 35 per cent. of all forest land and 79 per cent. of the Pine forest land. In the Shortleaf-Loblolly Pine type of the South, past management practices produced less than half the Pine which the land was capable of growing. Heavy cutting and fire have everywhere caused low productivity. Inadequate fire protection of slash was given by many owners as a reason for practising heavy cutting instead of selective cutting. More complete fire protection is essential in order to assure the best possible forest development. At present, while 98 per cent. of industrial lands are under co-operative agreement for fire protection, non-industrial owners are not co-operating with the State in fire protection.

[2171]. 60.31.2 : 07.1. ARNST, A. **Visual guides for farm forest management.** *J. For.* 44 (10), 1946 (731–4).

The United States Soil Conservation Service has developed graphic guides to assist farmers in planting, tending, and managing their woodlands. Two of these are reproduced and their use explained.

61. SURVEYING. MAPPING

[2172]. 61.32 (71). SEELY, H. E. **The use of air photographs for forestry purposes.** [Forest Service, Department of the Interior, Ottawa, Canada.] [n.d.] pp. [1] + 6.

This paper presents a brief report on the information that has been secured and the methods that have been developed by the Forest Service, Department of the Interior, Canada, in the application of air photographs to forestry purposes. Experience has shown that the forest detail on photographs is improved by the absence of deciduous foliage and the presence of snow in the winter, and that the best view of the timber is obtained at a steep oblique angle. Tree heights and crown diameters are obtained from fine measurements made in the photographs; the density of stands is revealed; hardwoods are separated from softwoods, and species identified; and estimates are made by the use of volumetric data based on height rather than diameter. Infra-red photography is still in the experimental stage and has not yet produced anything of special forestry interest except in the matter of tone values in some of the softwood species. Experiments are now being conducted, using green filters in conjunction with the regular panchromatic film, with a view to the differentiation of Jack Pine from Spruce. *From author's summary.*

[2173]. 61.32 : 43.1 : 32.2 : 45.3 (47.0). MOKEEV, G. A. Aviatsiya v lesnom khozyaystve. **[Aviation in forestry.]** *Lesnaya Prom.* Nos. 7/8, 1945 (20–1). [Russ.]

The chief phases in the use of aircraft in Russian forestry have been as follows:— (i) Aerial photography was first used in 1925 and by 1939, 20 million ha. had been covered by aerial photography, and the technique of interpretation had advanced greatly. (ii) Ocular appraisal of forests from the air started in 1931; the usual procedure in this case is for expert appraisers to cruise at a height of 300–400 m. along parallel routes. This method is especially useful in remote forests difficult of access from the ground and is cheap and rapid. In one hour of work in the air an appraiser is able to deal with about 35,000 ha. and his assignment for the summer season is about 12 million hectares. By 1 January, 1945, 63 per cent. of the total forest area under Narkomles had been inspected in this way. (iii) Aerial fire protection started in 1931, at first consisting only in the patrolling of forests. In 1936 a 'Forest Aviation Trust' was formed and this body recruited a corps of parachutist fire-fighters who have done very valuable work. The area protected from the air is now over 200 million ha. and stretches from the Finnish border, through the European part of the U.S.S.R. across Siberia to the Far East. (iv) In 1939, Narkomles Trust began to use aircraft to deliver personnel, tools, etc., for logging and floating operations in distant or isolated regions. (v) Aerial control of pests has been practised since 1926, when it was first used on an area of 634 ha. infested by *Porthetria monacha*, giving a kill of 90 per cent. Since then aerial control has been carried out almost every year against various pests in different regions of the U.S.S.R.

62. DIVISION OF THE AREA [COMMUNICATIONS]

[2174]. 62 : 07.7. KINGAN, J. L. **Radio today in forestry communication.** *Timber of Canada* 7 (1), 1946 (111–2).

63. ROTATION

[2175]. 63 : 12.25 (44). LEROY, R. Expériences et réflexions sur la production de gros bois d'oeuvre à propos des sapinières des Alpes-Maritimes. [**Experiences in, and considerations for the production of large timber, with particular reference to the Fir stands of the Alpes Maritimes.**] *Bull. Soc. for. Franche-Comté* 24 (2), 1943 (71–9). [F.]

[2176]. 63 : 12.26–8 : 22 : 57.9 (92). DANHOF, G. N. Over omloop en bedrijf van bakau-bakau in den Riouw-Lingga Archipel. [**On the rotation for and management of Bakau-bakau in the Rhio Archipelago.**] *Tectona* 36 (2), 1946 (59–72). [Du.e.]

It is calculated, on the basis of Watson's and Durant's yield tables corrected for local conditions (poorer soils) that a rotation of 15 years, giving an average girth of 10·6 in., is the most suitable for Bakau-bakau (*Rhizophora mucronata* and *R. conjugata*) in the Rhio Archipelago. The highest royalty per unit is paid by charcoal burners, who prefer trees 8–12 in. in girth, and the rotation arrived at is that of the most economic girth, which is suitable in view of the absence of quality increment.

Most of the Bakau-bakau area is cut-over forest of mixed age, and it is desirable to prohibit cutting below a girth of about 9 in. and to institute proper control of fellings. Research is necessary to determine whether intensified management. with clear felling and replanting, would be more rational than the present selective cutting.

64. DESCRIPTION OF SITE. ASSESSMENT OF SITE AND STAND QUALITY

[2177]. 64 : 12.25. GRAY, H. R. **Site classification of coniferous plantations.** *Austral. For.* 9 (2), 1945 (9–17).

The writer discusses the various definitions of height of crop used as an index of site quality and concludes that experience, especially with stands of *Pinus radiata*, has shown that the most satisfactory and practicable index for large-scale site classification of healthy stands is the age/height relation of the tallest trees in a crop at all ages. In young stands the tallest height corresponds to the American definition of 'Dominant height'; in a final crop, at rotation age, the tallest height is more or less identical with average dominant height. As an index of site, the tallest height has the following advantages:—(1) It is the height least likely to be affected by treatment, (2) it has practically the same identity at all times, (3) it is readily defined, (4) it is relatively easy to choose and measure, (5) the relatively few measurements necessary to define a site of a given area make it economical and practical for large-scale site classification. Two methods of obtaining a reliable age/height relation are discussed, namely: (*a*) from height measurements of standing trees in plots of different ages, and (*b*) from stem-analysis data, and there is a brief description of methods of estimating standard age and constructing generalized age/height curves and age/height tables, and of site classification in the field. [Cf. *For. Abstr.* 6 (265).]

67. WORKING PLANS

[2178]. 67 : 94.4. SINGH, C. H. **Expediting working plans for forest co-operative societies.** *Indian For.* 72 (6), 1946 (277–80).

The successful organization of working plans for forest co-operative societies in India depends to a large extent on (1) the maintenance of a permanent working-plan staff (including *patwaris* for demarcation, *darogha*, where required, and a draftsman); (2) the creation of a friendly public opinion on the part of the villagers; (3) the standardization of working plans for different types of forests; and (4) the timely submission and publication of closure notifications. Each of the above points is discussed in relation to the problem of bringing forest society working plans into operation with the minimum of delay.

7. FOREST ECONOMICS, VALUATION, AND FINANCE

76. MANAGEMENT STATISTICS

[2179]. 76 : 32 : 33.17 : 82 (75.6). SHAMES, L. M. **Logging and milling studies in the Southern Appalachian region. I. Cost analysis. II. Time studies. III. Lumber value yields. IV. Costs and returns.** *Tech. Notes Stheast. For. Exp. Sta.* Nos. 62–65, 1946. pp. 17 + 20 + 45 + 51.

The cost analysis which forms the first of these notes is based on data collected during a

logging operation on the Bent Creek Experimental Forest and the factors considered are felling, cross-cutting, skidding, log loading, hauling, and unloading, sawmilling, lumberyard costs. The second note is concerned with time studies and the third with analysis of lumber value yields, made during the same operation. The last note compares costs and returns under a variety of conditions with the purpose of providing an equitable basis for stumpage appraisal, and of indicating the margins available for stumpage and profit or loss by log and tree sizes.

[2180]. 76 : 60.31.2 : 12.25 (79.4). BARR, P. M. **Possibilities of forest management in a tract of California second-growth Pine.** *J. For.* 44 (9), 1946 (634–8). [School of Forestry, Univ. of California, Berkeley, Calif.]

Second-growth Pine forest covers an area of about 1¼ million acres in the Sierra Nevada. This paper presents a management analysis for a typical tract of 6,400 acres on which the growing stock and increment have been measured. The writer concludes that, at ruling stumpage prices and costs, and assuming that the land could be bought at $12.00 per acre (which is not probable), it would not be a good investment for an independent purchaser intending to practice forestry. He agrees that orthodox principles of good management demand that this type of forest should be given thorough protection with a prohibition of early cutting, but argues that financial considerations in turn demand some reduction in the standard of silvicultural requirements.

[2181]. 76.1 : 32 : 07.7. EMERY, K. M. **Determining equipment usage through cost analysis.** *Timber of Canada* 7 (1), 1946 (81–4).

Examples are given of cost analyses of skidding operations for the purpose of determining what form of traction, what type of road, and what spacing of roads, would be most economical. The formulae and methods used are those developed by D. M. Matthews in his book 'Cost Control in the Logging Industry' [cf. *For. Abstr.* 4 (172)].

8. FOREST ADMINISTRATION

[2182]. 8 (66.7) : 90 : 09.1. LOGAN, W. E. M. **The Gold Coast Forestry Department, 1908–45.** *Emp. For. Rev.* 25 (1), 1946 (52–9).

An historical account of the development of the Department since its foundation, with some indication of future expansion of its influence.

81. ORGANIZATION. REGULATION OF SERVICE

[2183]. 81 (73) : 60.31.2 : 91.8. SANDOZ, F. J. **An analysis of industrial forestry.** *J. For.* 44 (8), 1945 (565–72).

An account of the functions of an industrial forester—i.e. a trained forester employed in the management of privately owned forest land for the purpose of industrial harvest at a profit. Subjects discussed include public relations, forest protection, forest management, research, foresters' reports and records, staff, equipment and costs.

82. LABOUR QUESTIONS

[2184]. 82 (485). FLODMAN, B. **Work studies in woods operations.** *Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 853 (B–2), 1946. pp. 3. Also in *Pulp Paper Mag. Can.* 47 (9), 1946 (105, 108).

A Swedish standard method for time studies of woods operation is set out and explained.

[2185]. 82 (485). GÖTHNER, E. Några synpunkter på den fasta arbetskraftens löneförmåner inom skogsbruket. [**On the wage privileges of permanent labour in Swedish forestry.**] *Svenska SkogsvFören. Tidskr.* 44 (3), 1946 (223–41). [Sw.sw.]

[2186]. 82 (71.4). GRENIER, P. Le travail forestier dans le Lac St.-Jean. [**Forestry work in the Lac St.-Jean region.**] *For. québec.* 11 (6), 1946 (467–72). [F.]

An account of the labour situation in this district of Quebec, with statistics of employment, working conditions, etc.

[2187]. 82 : 32. HERRGEN, A. **Work simplification techniques applied to logging.** *Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 851 (A–2–a), 1946. pp. [3.]

[2188]. 82 : 33.51 : 32.3.2. FERREE, M. J. **Rate of mine prop production increases with size of trees.** *For. Econ. Note Ntheast. For. Exp. Sta.* No. 1, 1946. pp. 2.

Results of a time study to determine the time taken to fell, limb, skid, cross-cut and load each of 200 trees of 10 species and relate it to the d.b.h. and green weight in tons. It was found that man hours per ton decrease with an increase in tree size until the 14-in. diameter is reached, when the trend is reversed, though in a minor degree.

[2189]. 82 : 32.2 : 76.1 : 33.52. CUNNINGHAM, F. E., and FERGUSON, R. H. **Cost of producing hardwood ties in Connecticut.** *J. For.* 44 (9), 1946 (668–72).

In order to determine the effect of tree and log size on labour costs and to find where saving of labour could be effected, a time study was made on both logging and milling in a typical operation. It was found that trees larger than 18 in. in diameter were operated at not much more than half the labour cost required for a 10-in. tree. The following suggestions are made for more efficient operations: use of a 3-man felling crew, the third man notching the tree so that direction of fall and priority of felling of each tree is considered; training in use and care of chain saws; cross-cutting of logs over 12 in. in diameter with the chain-saw and of smaller logs with a 2-man crosscut saw or pulp saw; skidding of long logs to a central yard or mill yard for cross-cutting. As tree size is a major factor affecting logging and milling costs, operators should closely scrutinize those small trees which do not pay their way through the logging and milling operations.

[2190]. 82 : 32.25 (47.1). LUND, L., and LUNDGREN, N. P. V. Några erfarenheter från en arbetsfysiologisk undersökning på finska mästerhuggare. **[Some notes on a study of the physiology of work in Finnish champion woodcutters.]** *Svenska SkogsvFören. Tidskr.* 44 (4), 1946 (297–309). [Sw.sw.]

Medical examination of two prize-winners in the Finnish wood-cutting competition of 1945 showed that the physical capacity of the first prize-winner was roughly the same as, while that of the second somewhat exceeded, that of Swedish woodcutters previously studied, hence their good working results are attributable largely to technique. The motions of the two men (which were by no means identical) are discussed and illustrated by diagrams, the phases dealt with being—felling, trimming, barking and cross-cutting. In general, both of the men clearly thought out their work, but neither followed a rigid plan and the various phases were performed in varying orders and ways according to the convenience of the individual case.

[2191]. 82 : 32.25 : 07.7. MUNNEKE, J. F. Over stukloonen en gereedschappen bij het vellen van licht naaldhout. **[On piece-rates and tools in the felling of small-dimension conifers.]** *Nederl. Boschb.-Tijdschr.* 18 (5), 1946 (101–3). [Du.]

Includes a graph and table, based on the author's observations, to show time required to fell and trim Scots Pine of mean diameters between 6 and 14 cm., using bow-saws 80 cm. long with teeth 8 mm. high and 9 mm. broad. In the author's opinion, suitable weights and helve lengths for trimming axes are:—

Age of Stand (*yrs.*)	*Weight* (*kg.*)	*Helve* (*cm.*)
Below 35	1·00	50
35–50	1·25	65
Over 50	1·50–1·75	80–90

9. FOREST POLICY

[2192]. 9 : 06.2 : 05.3. **First annual report of the Director-General to the FAO Conference.** Food and Agriculture Organization of the United Nations, Washington, D.C. 1946. pp. 45.

90. GENERAL PRINCIPLES OF FOREST POLICY

[2193]. 90 (213) : 33. DESCH, H. E. **The contribution of tropical forests in post-war reconstruction.** *Aust. Timb. J.* 12 (6), 1946 (328, 331, 333). Cf. *For. Abstr.* 7 (No. 1995).

[2194]. 90 (46) : 92 : 09.1. ELORRIETA, O. Ordenación económica de la producción agraria **[Economic planning of agrarian production.]** [*Publ.*] *Inst. for. Invest. Exp., Madrid* 12 (19), 1941. pp. 166 + appendices. [Span.]

The historical résumé of Spanish agrarian policy covers forest policy and legislation from the 17th century to the present day. Recent

policy has been influenced by chemical developments, advances in the study of exotic species, and by national and world-wide propaganda for afforestation, conservation and improved land use. During the present century one hundred million pesetas have been set aside for afforestation in Spain and a Department of Forests, Game and Fish (Dirección General de Montes, Caza y Pesca) has been created. Other organizations interested in forestry and wood utilization, such as the Instituto Forestal de Investigaciones y Experiencias (1928), have also been set up in Spain in recent years.

[2195]. 90 (71). EISLER, H. P. **Planning for managed forests.** *For. Chron.* 22 (3), 1946 (194–200).

The writer attempts to show that the minimum fundamental requirements for planning for managed forests in Canada are improved protection, a forest inventory, rehabilitation and re-absorption of ex-service men in forestry work, soil surveys, and a general appreciation of the importance of the forests and the need of co-operation in their management.

[2196]. 90 (71.1). **Official summary of recommendations of the Royal Commission to inquire into the forest resources of British Columbia.** *Emp. For. Rev.* 25 (1), 1946 (66–85).

[2197]. 90 (71.1). GILMOUR, J. W. **Review of the Sloan Commission Report.** *Emp. For. Rev.* 25 (1), 1946 (86–91). [H. R. MacMillan Export Company, Ltd.]

[2198]. 90 (71.3). MORAN, F. B. **A broader approach to Canada's forest problem.** *Pulp Paper Mag. Can.* 47 (10), 1946 (111–6).

Cf. *For. Abstr.* 8 (No. 1520).

91. SOCIAL AND ECONOMIC INFLUENCE OF THE FOREST. NATIONAL PARKS. RESERVES. FOREST INFLUENCES

[2199]. 91 (931) : 97.2. ANDERSON, R. H. **The place of trees in land usage in New South Wales.** *J. Aust. Inst. agric. Sci.* 11 (2), 1945 (66–72). L.S.

The author discusses the fundamental services of forestry with special reference to New South Wales and briefly outlines the development of forestry in the State, future forest policy, post-war requirements, farm forestry, and community forests.

91.1. *Rural Preservation. Reserves. National Parks. Plant and Animal Protection*

[2200]. 91.1 (92) : 34.3 : 81. VOOGD, C. N. A. DE. Richtlijnen voor een doeltreffende jachtregeling en natuurbescherming in Nederlandsch-Indië. [**Outlines for a satisfactory regulation of hunting and nature protection in the Netherlands East Indies.**] *Tectona* 36 (2), 1946 (41–58). [Du.e.]

Before the Japanese invasion, five different authorities supervised hunting and nature protection in the Netherlands East Indies. The author proposes the establishment of a 'Permanent Council for Hunting and Nature Protection' and of a Service for the same purpose directly under the Department for Economic Affairs. Problems needing immediate study are outlined. *From author's summary.*

91.3. *Influence of the Forest on the Environment*

[2201]. 91.3 : 11.14. Sostienese que la tala de bosques no modifica las condiciones climaticas. [**It is claimed that the destruction of forests does not modify climatic conditions.**] *Mundo maderero* 7 (74), 1946 (15–6). [Span.]

Examples are given to show that there is no correlation between the destruction of forests and climatic deterioration. In Santiago del Estero and el Chaco, where forest exploitation has been heavy, rainfall has even increased since deforestation occurred. The factors determining abundance or scarcity of rainfall are believed to be chiefly solar and meteorological, and the possibility of the modification of climate by man is regarded as unlikely.

[2202]. 91.3 : 11.62. BURGER, H. **The effect of the forest on hydrographic conditions. III. Communication. The water complex in the Sperbelgraben and Rappengraben of the Emmenthal from 1927–28 to 1941–42.** (*Mitt. schweiz. Anst. forstl. Versuchsw.* 23 (1), 1943). Translation by A. L.

Griffith and C. W. A. Sondermann. *Indian For. Rec.* 6 (1), 1945 (publ. 1946). pp. 61 + plates + dgms. Cf. *For. Abstr.* 6 (122).

91.5. *Value of the Forest for Colonization*

[2203]. 91.5 (47.1) : 92 : 94.3. HELANDER, A. B. Kolonisationen och skogen: Några glimtar av ett problem i dagens Finland. **[Colonization and the forest: notes on a problem in present-day Finland.]** *Svenska SkogsvFören. Tidskr.* 44 (4), 1946 (344–9). [Sw.]

Further details of the scheme reported in *For. Abstr.* 7 (No. 2177) and a discussion of the difficulties involved.

94. FOREST OWNERSHIP. CO-OPERATIVES

[2204]. 94 (71.4) : 97 : 91.8. LARUE, M. Mémoire sur la situation forestière à St.-Raymond, Portneuf. **[Report on the forestry situation at St.-Raymond, Portneuf.]** *For. québec.* 11 (7), 1946 (539–57). [F.]

The parish of St. Raymond consists of some 200 sq. miles, mostly forest. Fifty years ago the lands were held by farmers who drew from their woodlots sufficient material to build and heat their houses, and the area also supported 20 small saw mills. Since then, Government has granted felling rights over 170 sq. miles to large paper and pulp industries which utilize only the softwoods, leaving in the forests the hardwoods, which they nevertheless refuse to allow the local farmers to use. Suggestions are made for putting at the disposition of the municipality the forest in its immediate neighbourhood.

[2205]. 94 (79.4). NELSON, DE W. **Public ownership of California forests.** *J. For.* 44 (8), 1946 (575–8). [Department of Natural Resources, Sacramento, Calif.]

The author discusses forest ownership in California and State policy with respect to it. He stresses particularly the economic handicaps involved in ownership of small properties and the poor chance of their proper management. He holds that lands not profitable in private ownership will ultimately drift into public ownership.

[2206]. 94.11 : 60.31.1. ORCHARD, C. D. **Planning the management of Crown forests for timber production.** *B. C. Lumberm.* 30 (7), 1946 (50, 57–8, 62, 74).

The author reviews the current conflicting views of the function of the State in forestry, compares the proportion of forest land in public and private ownership in various countries, and concludes that a central Government is best able to own and manage forest lands for timber production, but that a reasonable amount of private ownership, not exceeding, and preferably less than, 50 per cent., would introduce a healthy competition. Canada, which retains an average of 92 per cent. of forest lands in public ownership, is in a highly favourable position for evolving policy in this respect.

[2207]. 94.3 (485) : 96. EDLING, N. Skogsvårdsstyrelseregleringen. **[Reforms in the Swedish County Forestry Boards.]** *Svenska SkogsvFören. Tidskr.* 44 (4), 1946 (350–6). [Sw.]

Under new regulations, the Swedish County Forestry Boards remain largely independent and their activities will continue as before, with particular emphasis on educational and instructional work and on artificial regeneration. A representative of the forest rangers of each area may now take part in discussion, but not in actual decisions, at board meetings. Provision has been made for the chairman and members of boards to receive honoraria in future, as well as the minor allowances hitherto made for expenses. Staff and funds are being allocated on the basis of 'normal programmes' showing (as a very rough index) the number of travelling and duty days required for the normal activities of each board per year. The immediate goal is to meet 65 per cent. of the needs shown by these programmes, but even this will mean an expansion by about one-quarter (average for whole country) as compared with the peace years 1936–39. The boards in Norrland are to be treated as a special case for the present and will continue to be financed largely by official grants.

Establishments and conditions of employment of the permanent executives of the boards have been revised. Permanent staff establishments for each board are tabulated.

The finance of the boards is to be completely reformed in the interests of rough constancy of funds from year to year and their allocation according to the scope of operations in particular

regions. The forest conservation dues levied on private forests are in future to be charged annually at a rate of 1·5 per mille of the value of forest land plus growing stock, provided that this is 2,000 kr. or over, as assessed by the tax authorities. This should bring in State revenue of about 4·5 million kr., and as the net financial requirements of the boards will total about 7·2 million kr. annually, to be met by an annual State grant, the burden on the State will actually be about 2·7 million kr. p.a., as compared with an average for 1943–46 of 2 million kr. p.a. (the total of various kinds of subsidies). Boards will submit annual estimates through the Royal Forestry Board to the Crown, but will retain reasonable freedom in the disposal of funds.

The reforms mostly took effect on 1st July, 1946, but the change in the levying of forest conservation dues will not operate until March, 1948.

[2208]. 94.3 (73) : 60.31.2. BLACK, J. D. **The role of federal, State and local governments in promoting forestry.** *Proc. Amer. phil. Soc.* 89 (2), 1945 (434–43).

The writer outlines some of the ways in which governments can promote forestry on privately-owned land with illustrations from current American practice.

[2209]. 94.4 (54) : 60.2. SINGH, B. **Organization of co-operative *cho* reclamation societies.** *Indian For.* 72 (7), 1946 (317–20).

The main object of the Punjab co-operative *cho* reclamation societies is to manage village waste lands for timber, fuel, and fodder for the rightholders and for maximum revenue from the sale of surplus forest products. The present paper deals briefly with the formation of a *cho* reclamation society; application for closure; the management of the society; working plans; sowing and planting; the terracing and *wattbandi* of cultivated fields; co-operation between Revenue, Forest, Co-operative and Agricultural Departments; and defects in the working of the present system.

95. FOREST TAXATION

[2210]. 95.1 (410). **Income tax and death duties on woodlands.** *Leafl. For. Comm., Lond.* No. 12 (revised), 1946. pp. 10.

96. POLICY REGARDING PROTECTION FOREST AND DEFORESTATION

[2211]. 96.5 (44). CASTAGNOU, M. Mesures prises par l'état en faveur du reboisement. [**Measures taken by the State to promote reafforestation.**] *Rev. Eaux For.* 84 (8/9), 1946 (597–600). [F.]

A brief review of French State regulation and promotion of reafforestation by direct legislation or by tax policy.

[2212]. 96.5 (44). MESSINES, J. Actualité du reboisement. [**The pressing problem of reafforestation.**] *Rev. Eaux For.* 84 (8/9), 1946 (435–59). [F.]

A review of the present necessity of reafforestation in France, the measures proposed by the Direction Générale des Eaux et Forêts, the difficulties in the form of shortage of labour and equipment, the policy to be adopted in respect of subsidies, and some indication of the broad regions which are suited to different species. [See also *For. Abstr.* 8 (Nos. 1757–62.]

[2213]. 96.5 (469) : 35. MENDIA, J. M. DE ALMEIDA DE. Palavras do Director Geral dos Serviços Florestais e Aquícolas. [**Statement by the Director General of the Forest Service.**] *Agros, Lisboa* 27 (3/6), 1944 (112–4). [Port.]

In his introduction to a special number of *Agros* devoted entirely to Portuguese silviculture, the Director General of the Forest Service gives some data showing the importance of forestry in Portugal. Of the 27 countries of Europe, Portugal ranks ninth in respect of the area under forest (26·2 per cent.), and in 1941 her export of forest products amounted to 672,172,921 escudos. Law No. 1,971 of 1938 provides for the afforestation of 45,000 ha. in 30 years. Between 1939 and 1943, 23,526·91 ha. of hill lands and dunes were planted with trees, and 149,063·21 m. of roads were constructed in similar areas.

FORESTRY THE WORLD OVER

References: 1. *American Nurseryman*, Chicago. 2. *Australian Timber Journal*, Sydney. 3. *Bi-monthly Report of Forest Insect Investigation*, Ottawa. 4. *British Columbia Lumberman*, Vancouver, B.C. 5. *British Guiana, Report on the Forest Department*, Georgetown. 6. *Dansk Skovforenings Tidsskrift*, Copenhagen. 7. *Domestic Commerce*, Washington. 8. *Foreign Commerce Weekly*, Washington. 9. *Journal of the Arnold Arboretum*, Jamaica Plain, Mass. 10. *Lesnaya Promyshlennost*, Moscow. 11. *Nederlandsch Boschbouw-Tijdschrift*, Wageningen. 12. *Paper Industry*, Chicago. 13. *Pulp and Paper Magazine of Canada*, Gardenvale, Quebec. 14. *Revue du Bois et de ses Applications*, Paris. 15. *Revue internationale du Bois*, Paris. 16. *Skogen*, Stockholm. 17. *Southern Lumberman*, Nashville, Tenn. 18. *Technical Notes, Division of Wood Technology, For. Comm. N.S.W.*, Sydney. 19. *Timber and Plywood*, London. 20. *Timber News*, London. 21. *Timber Trades Journal*, London. 22. *Timberman*, Portland, Ore. 23. *Times*, London. 24. *West Coast Lumberman*, Seattle. The numbers in brackets indicate the reference number and the date of publication of the periodicals etc. to which the annotations refer.

Algeria. Scarcely half of the total timber requirements of Algeria are supplied by the domestic timber industry, and imports are necessary for many of the country's wood-working industries. Total annual production of logs from Algerian forests is about 24 million bd. ft. Of the total forested area of about 13,375,000 ha. only 1,800,000 ha. are of commercial importance, the remainder being covered with scrub growth. The principal commercial species (excluding firewood) are Aleppo Pine [*Pinus halepensis*] which covers about 700,000 ha., Cork Oak [*Quercus suber*] covering 440,000 ha., Zen Oak [? *Q. ilex*] covering 50,000 ha., and Cedar [*Cedrus atlantica*] covering 35,000 ha. The last-mentioned species is, however, for the most part inaccessible (**8**; 22.11.46).

Australia. First plantings were undertaken in the Wirrabarra forest in South Australia 87 years ago. They consisted of 500 acres of hardwoods with experimental sections of softwoods. A patch of Mediterranean Ash [? *Fraxinus ornus*] planted at that time has since dispersed seeds along the creeks, and the timber is now being purchased by an Adelaide firm for the manufacture of tennis racquets. Representations were made recently to the Minister of Agriculture against the milling of hardwoods, on the ground that the removal of large quantities from the forest would destroy the natural balance of trees and so injure the interests of apiarists. The Minister stated that there was no intention of replacing hardwoods by softwoods. Under the official planting programme it was planned to have 10,000 acres of hardwoods even at the completion of the full softwood programme (**2**; August 1946).

The Royal Commissioner investigating grazing in forest areas of Victoria has completed his report, which is now being considered by the Cabinet. Five of the principal recommendations are as follows:—(1) Subject to the directions of a Land Utilization authority, the control of all forest lands and all activities in the forests should be vested in the Forests Commission. (2) The Forests Commission, in exercising control of grazing, should be guided as far as possible by the advice of graziers. (3) A system of agistment of cattle by the Forests Commission should be instituted in forest grazing districts in which graziers have shown they are not to be trusted to protect the forests. (4) Forest materially injured by fires should be closed to all possibly injurious activities pending its regeneration. (5) The occurrence, in the assigned areas of a licensee or lessee, of injurious fires which cannot be considered to have been lit for a reason related to the grazier's rights or interest in the area, should be sufficient grounds upon which to deprive a grantee of all grazing rights (**2**; October 1946).

Large quantities of Cypress wood waste, mainly sawdust of *Callitris glauca* and *C. calcarata*, which has hitherto been dumped, is to be used for the extraction of essential oils by steam distillation.

The yield of oil is about 1 per cent. of the weight of sawdust. In the Pillaga State Forest, N.S.W., alone, about 50,000 tons of Cypress waste are produced annually (8; 26.10.46).

As a result of successful laboratory trials of bark of Black Cypress Pine (*Callitris calcarata*) for production of tannin, arrangements have been made for a factory-scale trial of this material in New South Wales. Indications are that a high yield of tannin may be expected, and, if the factory trial is successful, a considerable quantity of this hitherto wasted material can be utilized in the tanning of leather. Considerable quantities of tannin extracts are at present imported into New South Wales (2; August 1946).

In conjunction with the C.S.I.R. Division of Fisheries, a project has been begun to test the use of Cypress Pine [*Callitris glauca*] for oyster stakes, of which the oyster industry needs some millions a year and which are difficult to obtain in sufficient numbers. If Cypress Pine proves satisfactory it will enable the Forests Commission to thin the Cypress Pine forests profitably (2; October, 1946).

The woods of Yellow Carabeen (*Sloanea woollii*) and Silver Sycamore (*Cryptocarya glaucescens*), which are very much alike in colour and texture, may be distinguished by dropping a little ferric chloride (3 per cent. in water) on the cleaned surface of a sample, when the Yellow Carabeen gives an inky blue-black, and Silver Sycamore a greenish-black colour. Another means of distinguishing the two species is by the incense-like scent of the burning wood of Yellow Carabeen, which is not present in Silver Sycamore. The sapwood of the first is highly susceptible to borer attack, while that of the second is immune (18; March 1946).

For the first time in Australia the Victoria Forests Commission will this summer use R.A.A.F. planes to attack forest fires with chemical bombs. Thousands of bombs will be available from surplus R.A.A.F. stock, and they will be carried on routine forest patrols so that they may be dropped on fires as soon as detected. Bomb bursts will cover areas 40 by 10 yds., and bombs can be dropped from 300 ft. with good accuracy (2; October 1946).

After 5 months of field tests the Victoria Forests Commission has ordered a "Co-graph" map-making machine from the inventor, Lt.-Col. H. J. F. Coe of Malvern. This unique machine surveys as it travels. Two forest officers using the device have surveyed 32 miles in one day, compared with the 4-mile range of ordinary methods. Besides the reduction in time, costs are also cut by some 60 per cent. The use of this instrument will materially aid the Commission's fire-fighting campaign for the coming summer season. The rapid survey of bush-tracks and forest areas has already proved of great value (2; September 1946).

Bolivia. Nurseries and seedbeds for the growing of Eucalypt and Pine seedlings are maintained in the outskirts of La Paz by the Bolivian Railway Co. Seedlings are transplanted along the railway route in the hope that they will prevent erosion and beautify the approach to La Paz. It is intended eventually to cut and use them as mine props. Located at an altitude of 12,300 ft. these nurseries and seedbeds are among the highest in the world, and seedlings from them have been transplanted at altitudes ranging from 12,000 to 13,500 ft., the highest growing point for Eucalypts in that region. The company is endeavouring to find a type of Pine which will grow rapidly at these altitudes. So far 353,183 Eucalypts and 13,885 Pines have been planted on the slopes adjacent to the railway (8; 21.12.46).

Brazil. The discovery of extensive Mahogany (*Swietenia macrophylla*) forests a short distance from Belem, State of Para, is reported by the Brazilian Department of Agriculture. The local population was unaware of the value of the Mahogany and used the trees chiefly for firewood. The forests are within easy access of Belem and exploitation will be helped by easy transport (8; 5.10.46).

British Guiana. In the early part of 1946 an investigation was made and a memorandum submitted to Government on the timber industry in the northwest district. It is apparent that there has been heavy exploitation, particularly of Crabwood (*Carapa guianensis*), along the rivers of the fringing swamp forest and that these forests will shortly be worked out. There is, however, opportunity for establishing a permanent forest industry based on the Mora and mixed forests, provided that exploitation is carried out in a more orderly manner and logging is extended further

inland from the waterways. As a result of this investigation the formation of a Forest Division in the northwest has been approved, and funds secured under the Colonial Development and Welfare Act (**5**; 1946).

Canada. The salvage of timber in areas of severe defoliation by the Hemlock Looper, and the determination of kill, constitute a problem of immediate importance in Vancouver Island where there has been 100 per cent. defoliation of Hemlock over large areas. Information on what constitutes marginal defoliation beyond which death ensues, according to species, age, site, etc., is lacking. To provide such information a large series of permanent sample plots has been laid out, with trees individually tagged and recorded. Additional permanently marked cruise strips will supplement the data. Annual examinations will be made of plots and strips (**3**; Sept.-Oct. 1946).

Czechoslovakia. The Czech Government have recently published details of a two-year plan for the increase of production of all Czech industries during the next two years. The following production is planned for the timber industry in 1948:—Sawn goods, 2,828,000 cu. m.; plywood, 59,000 cu. m.; railway sleepers, 169,000 cu. m.; veneer, 5,874,000 sq. m.; woodpulp, 205,000 tons; paper, 197,000 tons; cardboard, 59,200 tons. The quantities to be felled in the forest are not shown in the plan, but it is understood that the felling will be done on the basis of the official annual programme which was in operation until the Munich Agreement. Over 80 per cent. of the timber felled will be deciduous (**21**; 30.11.46).

Nationalization has affected only about two-fifths of the whole timber and wood-working industry in Czechoslovakia. The production of plywood and veneer has been entirely nationalized, also that of bentwood furniture and matches, the greater part of the production of pencils, and impregnated wood products (railway sleepers and telegraph poles) (**21**; 28.12.46).

Finland. The total quantity of wood felled in Finland in the 1945-46 felling season was 57 million cu. m., equal to the sum of the total cuts for the two previous felling seasons. At the end of the season all but 1 million cu. m. of wood had been transported from the forests to the roadside loading points or the floating channels. This total cut, together with the loss from natural causes, is estimated to have exceeded annual growth by 5 million solid cu. m., but the greatly reduced fellings during the war had built up a considerable reserve of timber in the forests. The extraordinary quantity of wood brought out during the past season was attributed to the new increase in wage rates paid to induce labour to go into forest work, and special inducements such as extra rations. Premiums were also paid for extra output (**8**; 26.10.46).

France. The total quantities of wood used in the reconstruction of railway bridges of the S.N.C.F. was 175,000 cu. m. in the round (**14**; April 1946).

A federated wood council (Conseil interfédéral du Bois) has been formed in Paris, with its headquarters at the Fédération Nationale du Bois, 1 Place du Théâtre-Français, which comprises most of the national organizations interested in forestry and the timber industry (**14**; April 1946).

Germany. Forest operations in north-western Germany are reported to have exceeded normal levels. Cutting at the present rate, if continued, would reduce forest resources by 15 per cent. annually, and would constitute a significant danger to German forestry. About 875 acres were reforested in north-western Germany during the spring of 1946, which represented 10 per cent. of the area cut down. New plantings included 6 million Fine and 80,000 Japanese Larch. Nurseries are unable to supply the demand for young trees (**8**; 9.11.46).

There are in Germany 18 modern factories for the manufacture of fibre-board, capable of producing ¼ million tons a year. The latest and best equipped is that at Baiesbronn in the Black Forest, which is equipped to produce 30 tons a day. In France there is only one factory (at Pontarlier) producing fibre-board and its capacity is only 6,000 tons a year, while the estimated annual demand for fibre-board is between 50,000 and 100,000 tons. A new factory is now under construction in the Landes, and German equipment is to be transferred to it. Its capacity will be 12,000 tons (**14**; July-August 1946).

Great Britain. In the large temperate house at Kew the tree of *Magnolia mollicomata*, a Chinese species, is covered with flower buds. This flowered for the first time two years ago, in its 21st year, when it bore 122 blooms. Usually, Magnolias, when they first flower, have only a few blossoms, and the large number on this tree in 1945 was almost certainly an effect of shock from a bomb which fell near by. It is known that any stimulus just short of definite injury will cause plants to flower profusely, as was seen in some bombed sites in London. Last year the tree had only about 12 flowers, but this year it is going to have 100 or more (**23**; 3.1.47).

Before they issue licences for felling trees in two areas in Berkshire, the Board of Trade have undertaken to consult the Ministry of Town and Country Planning, who in turn will consult the Berkshire County Council. One of the protected areas comprises a strip of country two miles wide along the Berkshire side of the Thames from Lechlade to beyond Windsor. The other area, roughly 8 miles wide and 16 miles long, is on the Berkshire Downs. Berkshire is the first county to be so protected, and it is expected that neighbouring countries will soon follow this example (**21**; 21.12.46).

The Scottish Co-operative Wholesale Society has acquired the British rights in a process invented by R. F. J. Ubaghs in Holland, for the production of artificial wood from heather stems and resin. The heather is first blasted by sand and air to remove all roots, adhering soil, leaves, etc. It is then mixed with a suitable coal-tar resin and formed under pressure into hard, solid blocks. The finished product has an appearance not unlike Birdseye Maple; it is very hard, and eminently suited for the manufacturing of flooring and veneer (**19**; 17.9.46).

A site for a new wallboard mill has been acquired at Inverness. As a result of the heavy wartime fellings it is estimated that there is enough salvage material in the forests round Inverness to provide raw material for the industry for the next 50 years. The factory will employ about 600 persons (**8**; 30.11.46).

Chair-making is one of the oldest industries of Somerset, but the decline in Willow-growing (from 9,000 to 1,500 acres) has resulted in such a reduction of output that Willow growers can produce only 40 per cent. of the requirements of manufacturers. In the absence of cane, which in recent years replaced Willow for the frames of chairs, the wooden bends are now made from Ash and Beech grown in Somerset (**8**; 26.10.46).

The recent increase in *Lyctus* infestation in furniture is causing much concern. Replying to a recent question in Parliament, Sir Stafford Cripps stated that '. . . the only certain and practical way to eliminate the pest is to prevent the use of sapwood in manufacture, I am therefore taking measures to this end' (**20**; November 1946).

A remarkable discovery of two ancient boats has been made in the mudbanks between tide-marks on the Humber at North Ferriby, and the boats are now being excavated. They are supposed to be about 2,500 years old, and their construction throws considerable light on the technical ingenuity of their time. The normal development of the craft of boat-building in Europe shows a process of raising strakes on a dugout base, and gradual reduction of the dugout until it becomes a keel-plank. The North Ferriby boats are fully developed specimens of a dead-end in the design of what is, in effect, a laboriously constructed 'fabricated dugout'. The boats, which were at least 45 ft. long, had a broad, flat bottom, raked upwards at both ends like a punt and built up of five stout Oak planks sewn together with Yew withes. The bottom was further strengthened by a system of transverse bars passing through cleats on the face of the timber. The great thickness of the wood allowed the builders to run the risk of having a transverse joint in the middle of the centre plank, which is held together solely by the splinting effect of the planks on either side of it. Timbers cut on the curve completed the sides of the hull. The strength and thickness of the shell made framing unnecessary. The primitive device of sewing is further elaborated by the presence of longitudinal grooved joints on the edges of the planks, effectively sealed by moss caulking and an internal sealing slat sewn in along the seams (**23**; 5.11.46).

The roof of Westminster Hall was considerably damaged during an air raid in 1941, and steps are now being taken to repair it. About 3,000 cu. ft. of Oak are required to repair the hammer-beam roof. The timber will be procured from the estate of Lord Courthope at Whiligh, Wadhurst, Sussex. Richard II obtained the timber for the original roof in 1394 from Courthope of Wadhurst. Lord (then Sir George) Courthope supplied 17,000 cu. ft. from the Whiligh Estate when the roof

was reconstructed shortly before the late war. Several of the trees then cut showed 600 annual rings, and were, in fact, growing when the original Oaks were supplied to Richard II (**21**; 25.1.47).

Holland. The State is to grant subsidies of 50 per cent. of the normal planting cost for replanting of wartime fellings of forest and of roadside and dike plantations. Planting costs must exceed 200 guilders to qualify for the subsidy, which will be paid in two instalments (75 per cent. of the sum as soon as the State Forest Service is satisfied that the work has been properly executed, and the remaining 25 per cent. when any beating up, etc. has been done, if necessary). Replanting already completed also qualifies, provided that the above conditions are fulfilled (**11**; June 1946).

Japan. The Supreme Commander for the Allied Powers has ordered the dissolution of the Japan Lumber Co. and its subsidiaries. It will be replaced by local democratic associations of mill owners, forest owners and lumbermen. Log production during the financial year ended March 1946 averaged roughly 436 million bd. ft. monthly, compared with an average of 700 million bd. ft. in the calendar year 1944 and 590 million bd. ft. in 1942. In 1939 the average monthly output was 603 million bd. ft. compared with 280 million in 1930 (**17**; 15.12.46).

New Zealand. A comprehensive survey of New Zealand's timber resources has recently been started by the Forest Service. The survey, which is expected to take 5 years to complete, will give much basic data needed for the management of the indigenous forests. The first step was to obtain a series of aerial photographs covering all the forests in the country, on which it was found possible, after stereoscopic examination, to mark the boundaries of the various forest types. Maps were then prepared from the photographs. The nature of the New Zealand bush has in the past made the work of accurate surveying very difficult, and it is now much facilitated by the developments of aerial photography (**8**; 23.11.46).

The shortage of Australian hardwoods and the heavy demands for durable timbers have created a boom for operators in the Silver Pine [*Dacrydium westlandicum*] stands on the West Coast. The largest remaining virgin stands of Silver Pine are in far South Westland, but in this area the State Forest Service has adopted a policy of conservation, granting rights only where poles are required in the district itself by the Post and Telegraph Department (**2**; October 1946).

The New Zealand Forest Service has started a project at Granville, where an area of about 300 sq. miles is largely covered with second-growth Red Beech [*Nothofagus fusca*]. The Beech saplings will be systematically thinned, the thinnings being used as mine timbers, and the bare spurs of the hills running through the area will be planted with exotic softwoods, mainly *Cupressus macrocarpa*, *C. lawsoniana* and *Thuja plicata* (**2**; July 1946).

Nigeria. According to information from the Colonial Office, work on the building and equipping of a plywood factory in Sapele is proceeding rapidly. The plant will handle the whole processing of plywood from the original trimming of the logs to the export of dried plywood boards. The project will be entirely self-contained and will necessitate only the importation of mastic. The estimated output is about 3,000 tons of plywood per annum. An advantage, from the point of view of Nigerian forest reserves, is the fact that many timbers not normally exportable can be used. It is hoped that the mill, which will cost about half a million, will be ready to export veneer early in 1947 and will be in full operation on plywood production by the middle of the year (**19**; 26.9.46).

In order to meet large demands from the Union of South Africa for Nigerian timber, and as a first step towards finding markets in other parts of the world for the less well-known timbers, it has been decided to allow the export to South Africa without restriction of the following species:— Red Ironwood [*Erythrophleum guineense*], Camwood [*Pterocarpus* sp.], White Afara [*Terminalia superba*], *Brachystegia* spp. and Cottonwood (**21**; 21.12.46).

Philippines. Export of timber, lumber and logs from the Philippines to the United States was prohibited by the Philippine President on 26th August, 1946. This action was taken in the belief that it would aid in lowering prices of domestic lumber, which have recently been five times pre-war prices. Export of lumber and other building materials to countries other than the United States was prohibited in June 1946 (**8**; 9.11.46).

Scandinavia. Production of newsprint in the three Scandinavian countries of Norway, Sweden and Finland has been estimated between 455,000 and 505,000 metric tons during 1946, compared with about 400,000 tons during 1945 and 882,000 tons during 1937. Operations averaged 48 per cent. of capacity. Shortages of coal, electric power and various raw materials will not permit an appreciable increase in newsprint production during 1947 (8; 9.11.46).

At a conference held in Copenhagen on 28th May, 1946, a Scandinavian Forestry Union was established. The constitution of this Union was drawn up by a board of representatives of the State forest services, forest-owner's associations, silvicultural societies, forest research stations, and forestry schools in Denmark, Finland, Norway and Sweden. The declared objectives are (*a*) to exchange knowledge in all fields of forestry, and (*b*) to convey to those engaged in forestry in any one country further knowledge of forestry in the other countries. It is proposed to do this by organizing systematic co-operation between forestry institutes and forestry associations; arranging meetings and excursions; sponsoring bulletins, papers, and regular reviews of literature for publication in the forestry journals of all four countries; sponsoring lectures in each country by speakers from the other countries; creation of opportunities for tours of study by foresters in any of the four countries. Each country elects six representatives, who in turn appoint a delegate to the executive committee of four (one member for each country), the chairman of which is *ex-officio* President of the Union. Deputies are also elected for each representative and delegate. The term of office for all is three years and the presidency will go in rotation to each country. An office has been set up under some existing forestry organization in all four countries, and that of the country holding the presidency becomes the general secretariat for the period. Prof. A. Howard Grøn of Denmark is the first President, and the Union's general secretariat has been established at the offices of Dansk Skovforening, Vester Voldgade 86, Copenhagen V, which will function as an information centre for the next three years (**6**; October 1946).

Spain. Timber requirements are estimated at 3 million cu. ft. annually, made up as follows:—packing cases for oranges 435,000 cu. m., for fish 260,000 cu. m., for fruit and vegetables 202,727 cu. m.; railway sleepers 254,000 cu. m.; telegraph poles 305,000 cu. m.; reconstruction 452,000 cu. m. Production is only about 1 million cu. m. (**15**; November 1946).

Surinam. Although Surinam possesses vast hardwood forests, no large-scale exploitation has hitherto been possible, because of their inaccessibility. The Surinam Legislature has now approved the establishment of the Surinam Timber Foundation, of which the Surinam Government holds 190 shares and a woodworking company in Holland 210 shares. It will work some 10 million acres of Surinam forests, comprising all timberland not already in other hands or applied for (8; 23.11.46).

Sweden. In a doctoral thesis, N. P. V. Lundgren reports that health does not suffer from doing heavy forest labour. His studies, conducted under *Arbetsfysiologiska undersökningen* (a body founded on the initiative of the Värmland Association for Studies in Forest Work), were concerned mainly with circulation and respiration. The subjects were five trained woodcutters, aged from 26 to 55 years, working regularly in the woods for 9-14 months. During the period of observation their condition was unchanged or slightly improved; no sign of accumulated fatigue or over-exertion was detected, though towards the end of individual working days acute 'fatigue' of the circulation sometimes occurred. Of factors other than actual work, colds were accompanied by poorer circulation; alcohol taken during the evening depressed physiological condition the next day, and in some instances for several days afterwards, but the playing of games in the evening caused no fatigue on the following morning (**16**; 15.11.46).

Fiskeby Fabriks A.-B. has had good results from training selected forest workers as instructors on logging tools and their maintenance. The trained men, whose standing with the other workers is good, tour felling sites, inspecting and advising on tools, and reporting monthly on the suitability and condition of the tools used. An experiment is also being made with a central tool-maintenance shop. Drawings of suitable tools are circulated among the workers, and dealers in forest tools are kept informed of tools that have proved satisfactory. Two courses for workers, with emphasis on tools and their manufacture, but including more general instruction and some visits to woodworking

and pulp mills, were also held in Östergötland. These lasted three weeks each, and the participants received free board and lodging, family allowances and odd expenses, a condition which is regarded as necessary for the success of such undertakings. It is urged that, where possible, a course should consist of students who come from different companies or estates, which makes for a healthy interchange of experience. The results of these courses were regarded as very encouraging by both the directing staff and the students.

In a forest district in Norrbotten, a 7-day course was organized to train special foremen in reconnaissance for, and instruction in, the building and maintenance of extraction roads. It is expected that, after further instruction, these men will become instructors in extraction technique and the management of extraction roads in connexion with the rationalization programme (**16**; 15.11.46).

The Co-operative Association in Sweden has begun production of dry Torula yeast from sulphite waste liquor at a rate of about one ton daily. The Swedish Sugar Co. has also produced Torula yeast from hydrolysed beet pulp. The yeast has been added to soup given to Norwegian children and is expected to be used in mass-feeding in other countries (8; 5.10.46).

In view of the shortage of cholesterin, the usual starting point for the manufacture of pharmaceutical hormone preparations, Svenska Cellulosabolaget has recently installed large-scale plant, which is believed to be the first in the world and has now been running for 8 months, for obtaining phytosterins as a by-product in pulp manufacture from Scots Pine at its sulphate mill at Östrand. Phytosterin appears to be capable of replacing cholesterin to a considerable extent. The Östrand plant produces several thousand kilograms per annum, which are sold to pharmaceutical factories in all the great industrial countries. It is believed that the output of this factory will meet the whole world demand for a long time to come. The process used was invented by the company's own technicians (**16**; 15.10.46).

United States. The U.S. Forest Service is just starting a study of second-growth Douglas Fir in Oregon. The plan is for a comprehensive study, including the relation of quality of wood to conditions of growth. The machining characteristics, gluing and pulping properties, veneer cutting and preservative treatment are amongst the subjects to be covered (**22**; October 1946).

The proposed reorganization of the botanical section of Harvard University will involve the eventual transference of almost all the indoor staff of the Arnold Arboretum to Cambridge, Mass., where the Library and herbarium facilities of the Gray Herbarium, the Farlow Herbarium and the Arnold Arboretum are to be centralized (**9**; 1946).

The new research centre in Nicholet National Forest, in northern Wisconsin, consists of 4,000 acres of second-growth hardwoods and about 1,200 acres of coniferous swampland. Research will be concentrated on forest management and its aim will be to make the State self-supporting in forest raw materials (**12**; November 1946).

The American Lumber and Treating Co. are opening a new research laboratory at their plant at Wauna, Oregon. Facilities will include a pilot plant of sufficient size to handle pressure treatment of full-length lumber, resin impregnation apparatus, and equipment for gluing pressure-treated wood into large structural members (**24**; November 1946).

A new experiment in aerial sowing is being undertaken by the Crown Zellerbach Corp., Astoria, Ore. A newly developed tree-seed pellet, coated with fertilizer, root hormone and a substance toxic to rodents, will be sown from a helicopter. Six hundred acres in Clatsop County will be sown in this way with Port Orford Cedar, Noble Fir, White Fir and Hemlock (**12**; December 1946).

Further experiments are being made at New Haven in the chemical treatment of Dutch Elm disease [cf. *For Abstr.* 7 (1946)]. Some of the trees are receiving applications of oxyquinoline benzoate, which has given promising results in protecting seedling trees in the greenhouse and nursery. Two methods will be used. In the first the chemical will be watered on the soil so that it reaches the feeding roots of the tree and is taken up into the water-conducting system. The second method makes use of a sub-surface high-pressure nozzle which will penetrate about 18 in. below the surface of the ground, and force the liquid out at about 600 lb. pressure. The inoculated trees do not resist infection by the fungus, but counteract its poison so that the tree shows no symptoms of disease (**1**; 15.9.46).

Until the very rapid growth of the asphalt-roofing industry, wooden shingles were the most popular single roofing material in the United States. Production reached a peak of 19,176,000 in 1905 and had sunk to about 3 million in 1945. The growth of the asphalt-roofing industry, and the restrictions on the use of wood shingles by the building codes of many urban areas, are primarily responsible for this decline. About 95 per cent. of the wood shingles are made from Red Cedar [*Thuja plicata*], mostly in Washington and Oregon. Most of the imports are from British Columbia (**7**; October 1946).

Laminated wood rollers, now being produced in 3 weeks for wallpaper and linen manufacture, are displacing solid wood rollers which require 4 years to manufacture. The Timber Engineering Co. (1319, Eighteenth Street, N.W., Washington, D.C.) is manufacturing these rollers of thin, hard Maple boards, glued with waterproof adhesives (**4**; September 1946).

Native Juniper [? *Juniperus occidentalis*], which grows abundantly in eastern Oregon, shows promise of being a valuable source of cedrol, which is in great demand for the manufacture of insecticides, moth repellents, sprays, soaps, cosmetics, etc. The present source of cedrol is the Eastern Red Cedar [*Juniperus virginiana*], which is becoming rather scarce. Work still in progress at the Oregon Forest Products Laboratory, Corvallis, includes the sampling of yields of oil from a large number of selected trees from a variety of stands east of the Cascades (**22**; October 1946).

A new and more economical method for the production of turpentine and rosin is announced by the U.S. Department of Agriculture. It consists in putting pre-heated 'gum' or sap from the Southern Pine tree into one end of a new type of continuous steam still, and taking turpentine and rosin from separate points at the other end. Tests show that the new method is faster and cheaper than the 'batch' method in general use, and also produces rosin of a better grade (**17**; 15.12.46).

The Crosby Naval Stores company's factory at DeRidder, Louisiana, for processing Pine stumps, is to be completed by July, 1947, and the building up of a supply of old Longleaf Pine stumps has begun. The company hopes to accumulate between 10,000 and 75,000 tons of stumps by the time the stills are in operation. The company has purchased a large area of cut-over land, but for the present is keeping that in reserve, and offering a market to other owners. It will remove stumps from the lands of independent owners and pay them 25 cents a ton. [Cf. *For. Abstr.* 7 (p. 245)] (**24**; October 1946).

A continuous edge-gluing machine (the Diehl-Dosker No. 200) has been developed at Louisville, Kentucky. The machine glues longitudinally as well as continuously, pressure being automatically applied and released as the pieces to be glued are fed into the bed of the machine. As the edge-glued material passes through the machine, it passes under a high-frequency field which progressively cures the resin. The machine is very compact, having an overall length, including the feeding table, of less than 30 ft., and an overall width, in a 36-in. machine, of about 5 ft. The machine will glue panels at a rate of more than 1,000 sq. ft. per hour (**17**; 15.11.46).

The model B, Mammoth Tree Shears, has recently been perfected by the Mammoth Tree Shears Co., Georgetown, Texas. The shears can be adapted to fit any track-type tractor. They will cut softwood trees from 4 to 24 in. in diameter, when mounted on tractors of 50 h.p. or more. This operation requires only one man, the tractor operator. The shears do not crush the fibre of the wood, but cut smooth and clean with no splitting, and can cut as fast as the tractor can move from tree to tree. The price of model B, complete with extra blades, is $3,750.000 (**13**; December 1946).

The U.S. Forest Service and the Army Air Forces are co-operating to test the efficiency of water bombs dropped from the air on forest fires. The main object is to determine whether water bombs are a practicable means of slowing down hot fires until ground forces arrive. Some of the bombs will be designed to burst on impact. Others will be equipped with a proximity fuse, adjusted so that the containers will rupture at 30-50 ft. above the ground and cascade water on to the fire (**13**; December 1946).

U.S.S.R. Before the war the furniture industry was chiefly concentrated in the largest towns, two-thirds of the total output being produced in Moscow, Leningrad, and a few towns in the Ukraine, and costs to the consumer were high, owing to the long transport involved. It is now intended to disperse the factories more widely, and to produce better furniture at prices within everyone's reach (**10**; July-August 1945).